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Alternative Transportation Modes
Feasibility Study
Volume IV

YOSEMITE
National Park • California

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Alternative Transportation Modes
Feasibility Study
Volume IV

June 1994

YOSEMITE
National Park • California

United States Department of the Interior • National Park Service • Denver Service Center
Prepared by BRW, Inc., in association with Dames & Moore

This study has been prepared by BRW, Inc. and Dames and Moore under the direction of the Branch of Transportation, Denver Service Center, National Park Service. The study has been reviewed by the National Park Service and the U.S. Department of Transportation. Appropriate changes have been incorporated based on these reviews. NPS staff have provided assistance, review, and guidance during the course of the study. Special thanks are extended to the staff of Yosemite National Park for their assistance in collecting and assembling data. The staff of the Yosemite Park and Curry Company are also recognized for their contributions to the study.

CONTENTS

PURPOSE i

PREFACE ii

EXECUTIVE SUMMARY ES-1
  VISITATION ES-2
  TRANSPORTATION IN YOSEMITE ES-5
  TRANSPORTATION ALTERNATIVES ES-11
  EVALUATION SUMMARY ES-22
  RELATED VISITOR MANAGEMENT MEASURES ES-25
  IMPLEMENTATION AND FUNDING OPTIONS ES-27

PROBLEM STATEMENT 1
  PROGRESS TO REDUCE VEHICLE IMPACTS 1
  PARKWIDE CONDITIONS 2
  VISITATION LEVELS 2
  VISITOR USE PATTERNS 3
  ACTIVITY AREA CONDITIONS 4
  ACCOMMODATING VISITOR USE 7

PARK OVERVIEW 8
  REGIONAL CONTEXT 8
  PARK PURPOSE 8
  MAJOR RESOURCES 9
  PARK ENVIRONMENT 12

EXISTING CONDITIONS 15
  VISITATION 15
  VISITOR USE PATTERNS 20
  VISITOR EXPERIENCE 22
  VISITOR CHARACTERISTICS 24
  VISITOR FACILITIES 26
  TRANSPORTATION FACILITIES 30
  PARKWIDE TRANSPORTATION SERVICES 37
  PARKWIDE TRANSPORTATION CONDITIONS 39
  ENVIRONMENTAL CONDITIONS 43
  MARIPOSA GROVE EXISTING CONDITIONS 54
  TUOLUMNE MEADOWS EXISTING CONDITIONS 69
  YOSEMITE VALLEY EXISTING CONDITIONS 83
  CRITICAL TRANSPORTATION ISSUES 109
  CRITICAL RESOURCE ISSUES 110
  OTHER PLANNING STUDIES 111

ALTERNATIVES DEVELOPMENT AND SCREENING 113
  CRITERIA FOR DEVELOPMENT AND EVALUATION OF ALTERNATIVES 113
  INITIAL TRANSPORTATION ALTERNATIVES 115
  FINAL ALTERNATIVES DEFINITION 133

ALTERNATIVES EVALUATION 146
- MARIPOSA GROVE ACCESS 146
- TUOLUMNE MEADOWS/TIOGA ROAD CIRCULATION 149
- YOSEMITE VALLEY ACCESS AND CIRCULATION 152

IMPLEMENTATION ISSUES 159
- CONCEPTUAL ENGINEERING AND ALTERNATIVES ANALYSIS 159
- PRELIMINARY ENGINEERING AND FINAL ENVIRONMENTAL DOCUMENTATION 160
- FINAL DESIGN, CONSTRUCTION, OPERATIONS 160
- STAGED IMPROVEMENT TO YOSEMITE VTS SERVICES 161
- RELATED VISITOR MANAGEMENT MEASURES 163
- FUNDING OPTIONS 164

FIGURES

FIGURE ES-1: YOSEMITE MONTHLY AND ANNUAL VISITATION ES-3
FIGURE ES-2: VISITOR TRAVEL PATTERNS ES-4

FIGURE 1: YOSEMITE MONTHLY AND ANNUAL VISITATION 16
FIGURE 2: MONTHLY VISITATION FORECASTS 17
FIGURE 3: PROPORTION OF VISITORS IN 1991 STAYING OVERNIGHT 18
FIGURE 4: VISITOR TRAVEL PATTERNS 23
FIGURE 5: TOUR BUS TRIPS INTO PARK 25
FIGURE 6: TRAFFIC COUNTS AT VALLEY CHAPEL AND SUNNYSIDE CAMPGROUND 42
FIGURE 7: TRAFFIC COUNTS ON BIG OAK FLAT ROAD, WEST OF TIOGA PASS ROAD 44
FIGURE 8: TRAFFIC COUNTS NEAR THE SOUTH ENTRANCE 45
FIGURE 9: TRAFFIC COUNTS AT TIOGA PASS ENTRANCE 46
FIGURE 10: TRAFFIC COUNTS AT ARCH ROCK ENTRANCE 47
FIGURE 11: TRAFFIC COUNTS ON GLACIER POINT ROAD 48
FIGURE 12: WAWONA SHUTTLE BUS PASSENGER COUNTS 57
FIGURE 13: WAWONA AND MARIPOSA GROVE PARKING OCCUPANCY SUMMARY 60
FIGURE 14: MARIPOSA GROVE PARKING DURATIONS 61
FIGURE 15: WAWONA STORE PARKING DURATIONS 62
FIGURE 16: MARIPOSA GROVE ACTIVITY DETAIL 63
FIGURE 17: SOUTH ENTRANCE INTERSECTION CONFIGURATION 64
FIGURE 18: SOUTH ENTRANCE INTERSECTION TURNING MOVEMENTS 66
FIGURE 19: TUOLUMNE MEADOWS DEVELOPMENT PARKING OCCUPANCY SUMMARY 76
FIGURE 20: TUOLUMNE MEADOWS DEVELOPMENT OVERFLOW PARKING OCCUPANCY SUMMARY 77
FIGURE 21: TIOGA ROAD PARKING OCCUPANCY SUMMARY 78
FIGURE 22: TUOLUMNE AND TIOGA ROAD PARKING DURATIONS 79
FIGURE 23: TUOLUMNE SHUTTLE BUS PASSENGER COUNTS 80
FIGURE 24: PROPORTION OF VALLEY VISITORS USING SHUTTLE 93
FIGURE 25: YOSEMITE VALLEY SHUTTLE BUS PASSENGER COUNTS 94
FIGURE 26: YOSEMITE VILLAGE DEVELOPMENT PARKING OCCUPANCY SUMMARY 95
FIGURE 27: INFORMAL DAY USE PARKING, VALLEY PARKING OCCUPANCY SUMMARY 96

FIGURE 28: FORMAL DAY USE PARKING, VALLEY PARKING OCCUPANCY SUMMARY 97
FIGURE 29: AHWAHNEE HOTEL COMPLEX PARKING OCCUPANCY SUMMARY 98
FIGURE 30: YOSEMITE LODGE COMPLEX PARKING OCCUPANCY SUMMARY 99
FIGURE 31: CURRY VILLAGE COMPLEX PARKING OCCUPANCY SUMMARY 100
FIGURE 32: YOSEMITE VALLEY PARKING DURATIONS 101
FIGURE 33: YOSEMITE VALLEY VISITOR CENTER PARKING DURATIONS 102
FIGURE 34: YOSEMITE VILLAGE GENERAL STORE PARKING DURATIONS 103
FIGURE 35: YOSEMITE VALLEY, CURRY ORCHARD PRIMARY DAY USE PARKING DURATIONS 104
FIGURE 36: TRAVEL PATTERN IMPACTS ON REMOTE VALLEY STAGING 123
FIGURE 37: VISITOR TRAVEL PATTERNS 124

TABLES

TABLE ES-1: DAILY VISITOR USE LEVELS FOR DEVELOPED AREAS IN YOSEMITE ES-5
TABLE ES-2: YOSEMITE VALLEY DAILY VEHICLE ACCESS AND EGRESS TRIPS BY VISITORS ES-11
TABLE ES-3: COMPARISON OF REMOTE AND IN-VALLEY STAGING AREAS FOR YOSEMITE VALLEY ACCESS ES-16
TABLE ES-4: COMPARISON OF VALLEY STAGING AREAS ES-20
TABLE ES-5: COST SUMMARY FOR MARIPOSA GROVE ACCESS ALTERNATIVES ES-23
TABLE ES-6: COST SUMMARY FOR TUOLUMNE MEADOWS SHUTTLE ALTERNATIVES ES-25
TABLE ES-7: COST SUMMARY FOR YOSEMITE VALLEY VTS ALTERNATIVES ES-26

TABLE 1: VISITATION LEVELS AT YOSEMITE ACTIVITY AREAS 3
TABLE 2: YOSEMITE RECREATIONAL VISITS 19
TABLE 3: VISITOR USE LEVELS FOR DEVELOPED AREAS IN YOSEMITE 20
TABLE 4: YOSEMITE OVERNIGHT ACCOMMODATION UNITS 28
TABLE 5: YOSEMITE OVERNIGHT VISITOR CAPACITY 28
TABLE 6: YOSEMITE VALLEY DAILY VEHICLE ACCESS AND EGRESS TRIPS BY VISITORS 86
TABLE 7: PARKING AND SHUTTLE NEEDS FOR REMOTE STAGING AREAS 120
TABLE 8: COMPARISON OF REMOTE AND IN-VALLEY STAGING AREAS FOR YOSEMITE VALLEY ACCESS 125
TABLE 9: COMPARISON OF VALLEY STAGING AREAS 131
TABLE 10: COST SUMMARY FOR MARIPOSA GROVE ACCESS ALTERNATIVES 149
TABLE 11: COST SUMMARY FOR TUOLUMNE MEADOWS SHUTTLE ALTERNATIVES 151
TABLE 12: COST SUMMARY FOR YOSEMITE VALLEY VTS ALTERNATIVES 155

MAPS AND CHARTS

PROPORTIONS OF PEAK SEASON VEHICLE ENTRIES ES-7
POTENTIAL REMOTE VALLEY STAGING AREAS ES-18
YOSEMITE VALLEY STAGING OPTIONS ES-19
MARIPOSA GROVE ACCESS ALTERNATIVES ES-29
EVALUATION SUMMARY CHART, MARIPOSA GROVE ACCESS ALTERNATIVES ES-30

TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVE ES-31
TIOGA ROAD ACCESS/TUOLUMNE MEADOWS CIRCULATOR SHUTTLES ALTERNATIVE ES-32
EVALUATION SUMMARY CHART, TUOLUMNE MEADOWS CIRCULATOR/ TIOGA ROAD ACCESS SHUTTLES ALTERNATIVES ES-33
YOSEMITE VALLEY VTS ALTERNATIVE ES-34
EVALUATION SUMMARY CHART, YOSEMITE VALLEY VTS ALTERNATIVES ES-35
YOSEMITE VALLEY VTS - STAGE I ES-36
YOSEMITE VALLEY VTS - STAGE II ES-37
YOSEMITE VALLEY VTS - STAGE III ES-38
VICINITY MAP 10
PARK OVERVIEW 11
VISITOR FACILITIES OUTSIDE OF MAJOR ACTIVITY AREAS 27
PROPORTIONS OF PEAK SEASON VEHICLE ENTRIES 40
1991 AVERAGE DAILY TWO-WAY TRAFFIC FOR JULY 41
WAWONA/MARIPOSA GROVE AREA DETAIL 56
WAWONA/MARIPOSA GROVE HABITAT CONCERNS 67
TUOLUMNE MEADOWS/TIOGA ROAD AREA DETAIL 72
TUOLUMNE MEADOWS/TIOGA ROAD SHUTTLE DESCRIPTIONS 75
TUOLUMNE MEADOWS/TIOGA ROAD HABITAT CONCERNS 82
YOSEMITE VALLEY AREA DETAIL 85
YOSEMITE VALLEY SHUTTLE DESCRIPTION 90
YOSEMITE VALLEY AND VICINITY HABITAT CONCERNS 107
TUOLUMNE MEADOWS/TIOGA ROAD STAGING AREA OPTIONS 121
POTENTIAL REMOTE VALLEY STAGING AREAS 126
YOSEMITE VALLEY STAGING OPTIONS 129
YOSEMITE VALLEY LOOP VTS ALTERNATIVE 134
YOSEMITE VALLEY BI DIRECTIONAL VTS ALTERNATIVE 135
MARIPOSA GROVE ACCESS ALTERNATIVES 140
TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVE 141
TIOGA ROAD ACCESS/TUOLUMNE MEADOWS CIRCULATOR SHUTTLES ALTERNATIVE 142
YOSEMITE VALLEY VTS ALTERNATIVE 143
VALLEY EXISTING CONDITIONS; VALLEY VIEW WITH AT-GRADE LIGHT RAIL TRANSIT SYSTEM; VISUAL IMAGE 144
VALLEY EXISTING CONDITIONS; VALLEY VIEW WITH ELEVATED RAIL TRANSIT SYSTEM; VISUAL IMAGE 145
EVALUATION SUMMARY CHART, MARIPOSA GROVE ACCESS ALTERNATIVES 156
EVALUATION SUMMARY CHART, TUOLUMNE MEADOWS CIRCULATOR/ TIOGA ROAD ACCESS SHUTTLES ALTERNATIVES 157
EVALUATION SUMMARY CHART, YOSEMITE VALLEY VTS ALTERNATIVES 158
YOSEMITE VALLEY VTS - STAGE I 165
YOSEMITE VALLEY VTS - STAGE II 166
YOSEMITE VALLEY VTS - STAGE III 167

APPENDICES

APPENDIX 1: YOSEMITE PARKING AREA LAYOUTS
APPENDIX 2: YOSEMITE PARKING OCCUPANCY SUMMARIES
APPENDIX 3: YOSEMITE SHUTTLE AND TOUR PASSENGER DATA
APPENDIX 4: YOSEMITE ADDITIONAL PARKING DURATION SUMMARIES
APPENDIX 5: YOSEMITE ADDITIONAL TRAFFIC COUNT INFORMATION
APPENDIX 6: YOSEMITE ACCESS AND VTS ALTERNATIVE COST ESTIMATES
APPENDIX 7: EXISTING INTERSECTION CONFIGURATIONS AT KEY YOSEMITE VALLEY LOCATIONS
APPENDIX 8: YOSEMITE VTS ALTERNATIVE INFORMATION SUMMARIES
APPENDIX 9: YOSEMITE VALLEY REMOTE AND IN-VALLEY STAGING AREA EVALUATION WORKSHEETS

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PURPOSE

Section 1050 of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240, requested that a study be conducted of alternatives for visitor transportation in the national park system. Because of congressional intent and interest, the study used Denali National Park and Preserve, and Yellowstone and Yosemite national parks as case study examples. Each of these park units has special transportation problems.

The major purpose of this study, as stated in the 1991 act, is to evaluate the following:

> 1. The economic and technical feasibility, environmental effects, projected costs, and benefits as compared to the costs and benefits of existing transportation systems, and general suitability of transportation modes that would provide efficient and environmentally sound ingress to and egress from National Park lands; and
>
> 2. Methods to obtain private capital for the construction of such transportation modes and related infrastructure.

The study included an evaluation of specific alternatives to private vehicle travel in each of the three parks and a comprehensive inventory of transportation technologies that can serve visitor transportation needs within the national park system.

Transportation problems in the national park system are a cause for increasing concern. The issues leading to this study included the following:

- increasing traffic congestion in many park units, indicating a need for alternative transportation modes to enhance resource protection

- potential enhancement of the visitor experience and reduced vehicular congestion with the increased use of visitor transportation systems

- increasing rates of deterioration of park roads from increased traffic and age

- rapidly expanding roadway construction needs

The information presented in this study is intended for use in the conceptual development and evaluation of transportation alternatives in Yosemite National Park. It provides a preliminary assessment of the feasibility of visitor transportation system options in the park. The study is not intended to produce a recommended alternative for visitor transportation. More in-depth engineering and environmental impact analyses of specific conditions will be required to confirm the cost estimates presented here and to conform to the National Environmental Policy Act and other legislative requirements for proposed improvements in units of the national park system.

PREFACE

The *Alternative Transportation Modes Feasibility Study* is presented in four separate volumes. This volume, Volume IV, presents the findings of the feasibility study for Yosemite National Park, located in east-central California. Volume I provides an overview of transportation planning for national parks and an inventory of alternatives to private vehicle travel within parks. Volumes II and III present the results of evaluations of alternative transportation systems for Denali National Park and Preserve and Yellowstone National Park, respectively.

Throughout the *Alternative Transportation Modes Feasibility Study*, only those transportation technologies that have been proven in everyday use have been evaluated in detail. Volume I identifies emerging technologies that show the greatest promise for future application in the national park system. As these and other new technologies are developed and proven, a broader range of options may be available for use in park units.

The study has concentrated on transportation within and near Yosemite. The transportation of visitors to recreation sites from remote locations was not considered directly during this study. However, the National Park Service (NPS) recognizes the value of integrating the planning of transportation systems within the parks with the efforts of surrounding communities to address transportation issues. Visitor transportation systems in the parks must respond to transportation requirements that will vary depending on visitors' means of traveling to parks.

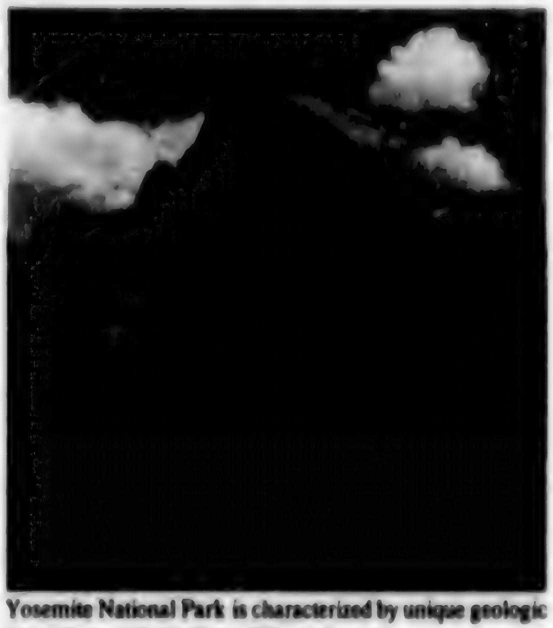
Undoubtedly, many opportunities will be available to enhance the economic development potential of gateway communities and to reduce the impacts of transportation on park resources by providing innovative transportation systems based in the gateway communities. Such systems could be extensions of or complements to internal visitor transportation systems. A cooperative approach to visitor access and internal park transportation could enhance efforts to preserve regional ecosystems while improving the overall quality of visitors' experiences in national parks.

The movement of visitors to and between attractions within parks accounts for the majority of travel within the national park system. Consequently, the resources available for this study have been concentrated on the question of how best to serve the transportation needs of visitors. Frequently, the transportation of NPS and concessioner employees is also an issue, especially at the larger park units. Specific planning efforts in each park unit should explore the opportunity to address both visitor and employee transportation needs with alternative transportation systems. The ability to serve both groups of travelers with a single system will depend on the location of employee housing, an issue which is outside the scope of this study.

Transportation planning for parks is but one element of a complete and systematic planning process that is conducted to determine the future of the nationally significant areas that have been set aside as units of the national park system. As urban planning professionals have recognized that effective land use and transportation decisions cannot be made independently, recreation and park planners and managers have increasingly embraced the idea of coordinated planning for resource management, visitor facilities, and transportation systems.

Transportation systems in national parks play a crucial role in determining the quality of visitors' experiences in the parks and have a strong influence on resource preservation. In developing transportation alternatives for Yosemite and other units of the national park system, management and staff should consider how those alternatives can best support the broader purpose and values of the National Park Service and the individual park.

EXECUTIVE SUMMARY



Yosemite National Park is characterized by unique geologic formations and pristine wilderness areas.

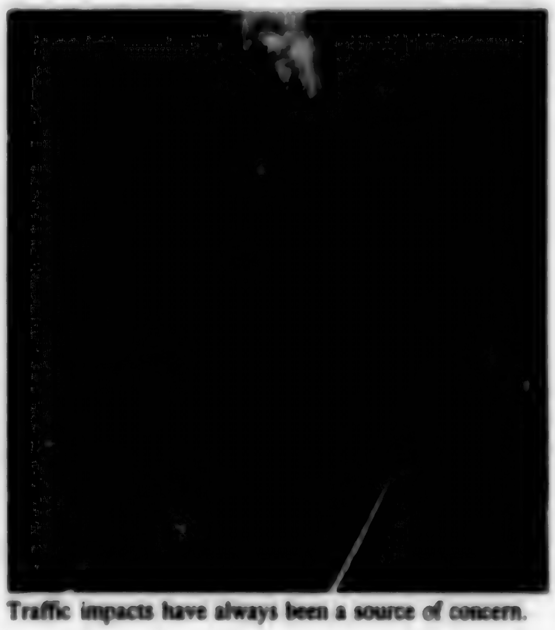
Yosemite is internationally recognized for its spectacular granite walls, waterfalls, clear streams, unique forest habitats, and biological diversity. The 1,200 square mile park contains 600 lakes, 1,300 miles of streams, 800 miles of trails, 350 miles of roads, and 2,000 campsites. The park is one of the crown jewels of the national park system and has an important place in the history of the conservation movement in the United States. Scenic beauty and access to pristine wilderness areas are among the most significant assets of Yosemite. It was designated a world heritage site in 1984.

Transportation to and within the park has been a source of conflict and controversy over most of Yosemite's history. Automobiles were banned from the park between 1907 and 1913. After 67 years of private vehicular access, and in response to the undesirable impacts associated with spiralling growth in traffic volumes and an ever-increasing demand for parking, the 1980 Yosemite General Management Plan (GMP) stated:

> Increasing automobile traffic is the single greatest threat to enjoyment of the natural and scenic qualities of Yosemite. . . . The ultimate goal of the National Park Service is to remove all private vehicles from Yosemite Valley. The Valley must be freed from the noise, the smell, the glare and the environmental degradation caused by thousands of vehicles.

Several planning efforts have suggested ways to reduce the influence of private vehicles in Yosemite Valley since the general management plan was written 13 years ago. Meanwhile, two other areas of the park have experienced substantial growth in visitation, resulting in congested conditions and an increasingly urban character of visitor experience.

The Mariposa Grove of giant sequoia trees, near Yosemite's south entrance, and Tuolumne Meadows near the east entrance, now experience parking shortages and traffic conflicts on a daily basis. Visitor transportation systems are operated by the Yosemite concessioner under the management of the National Park Service (NPS) in Yosemite Valley, the Mariposa Grove/Wawona area, and Tuolumne Meadows.



Traffic impacts have always been a source of concern.

These systems have helped meet visitor transportation needs in these areas, but increasing delays from vehicular traffic, and inadequate parking facilities for access to the transportation systems have limited their

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effectiveness. This Alternative Modes Feasibility Study examined opportunities to improve visitor transportation system (VTS) service in each of these major activity areas within Yosemite National Park. The study also evaluated alternative strategies to intercept private vehicle trips bound for Yosemite Valley at remote locations within the park and outside the park boundaries.

VISITATION

Visitation to Yosemite has increased steadily over the last decade. In 1981, the number of recreation visitors to Yosemite was 2.5 million. Through the 1980s, visitation increased at an average of 3.1% per year to reach more than 3.4 million in 1991. Visitation to Yosemite totalled nearly four million in 1992. A strong seasonal visitor pattern is evident at Yosemite, as shown in figure ES-1; with low visitation in the winter, very high visitation in the peak months of July and August, and moderate visitation in the spring and fall shoulder months. Monthly visitation totalled more than 600,000 in both August 1991 and August 1992. Forecasts of future visitation indicate that visitation growth will occur primarily in the shoulder season, with the maximum monthly visitation remaining at about 600,000.

Nearly all of the recent growth in visitation at the park is associated with increasing day use. In 1981, day users accounted for 15% of all park visitation. By 1991, 37% of visitors were making day trips into and out of the park. The concession services plan and the general management plan call for a reduction in overnight lodging and camping facilities in the park. Since overnight lodging and camping accommodations are nearly fully occupied on a year-round basis, day use trips will continue to account for nearly all of the growth in travel to Yosemite.

The general management plan established maximum daily visitation levels for each of the activity areas in the park. Limits, based on the estimated carrying capacity of visitor facilities were defined for day use and overnight visitation, as shown in table ES-1. These daily visitation limits were used to define the peak requirements for the VTS alternatives evaluated in this study. On the busiest summer weekends, traffic counts and parking occupancy studies conducted in 1992 indicated that visitation at Yosemite had reached the prescribed limits, affording further evidence that future visitation increases will result from growth in off-peak attendance.

The travel patterns of visitors within Yosemite have a significant influence on the viability of VTS alternatives. Over 60% of visitors travel to Yosemite as part of a larger vacation itinerary. Many of the trips made by these visitors enter the park at one location and leave at a different location. Visitor surveys indicate that 70% of all Yosemite visitors travel to Yosemite Valley for a portion of their stay in the park. More in-depth data on the travel patterns of visitors was collected over a 6 day period from August 12 through August 17 1993, including weekdays and weekend days. From this data it was determined that 57% of all visitors enter and leave the park via different entrance stations and that 50% of all visitors to Yosemite Valley also travel to one of the other major activity areas within the park. Only 21% of the Yosemite Valley visitors contacted during the survey period visited the valley only and entered and exited the park through the same entrance station. Figure ES-2 shows the overall visitation patterns of Yosemite Visitors.

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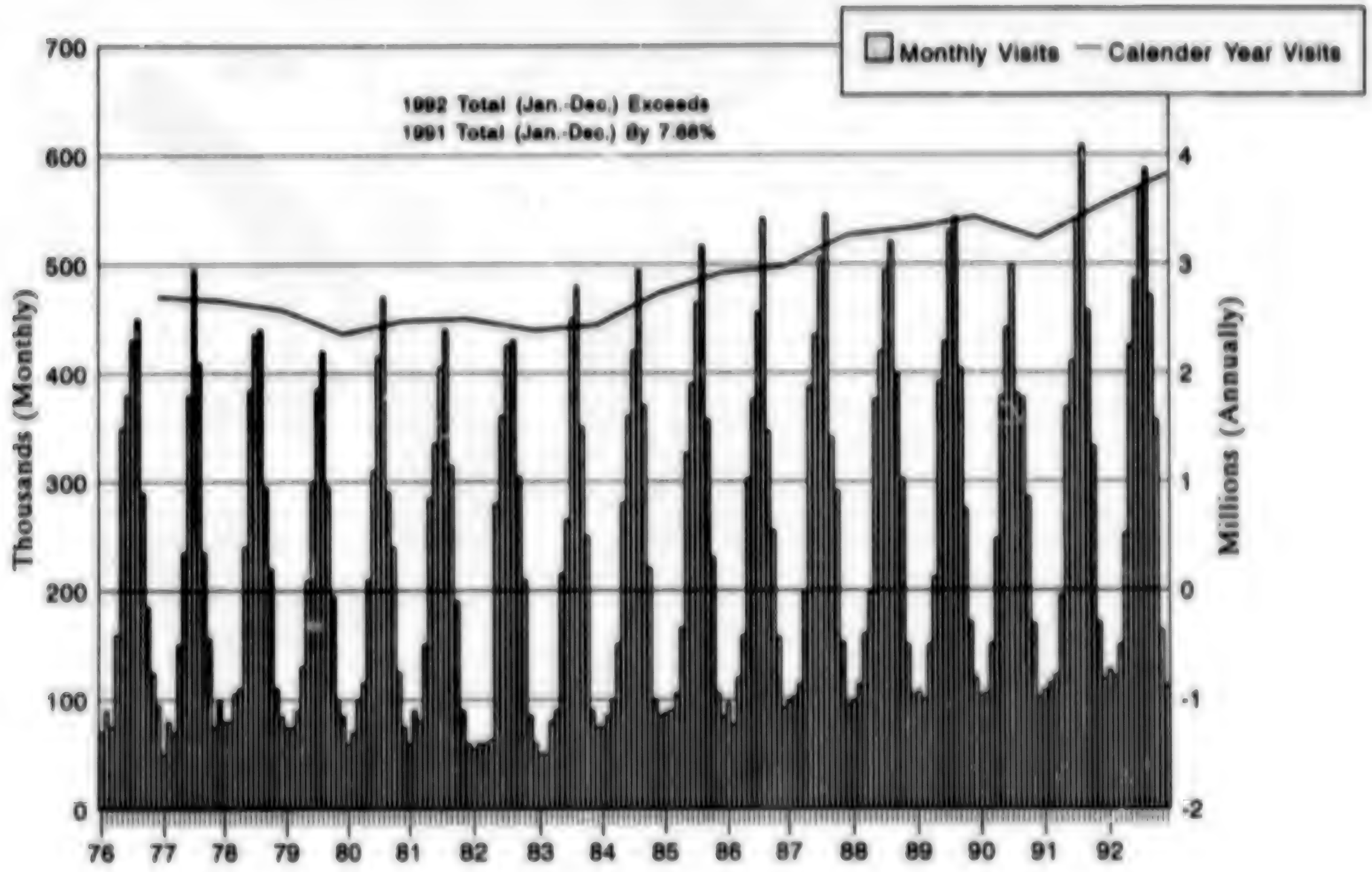
Figure ES-1: Yosemite National Park

Yosemite Monthly and Annual Visitation



SOURCE: Yosemite staff, Yosemite Transportation Strategy
(Prepared By The Wilderness Society, 1992)

Figure ES-2: Yosemite National Park

Visitor Travel Patterns

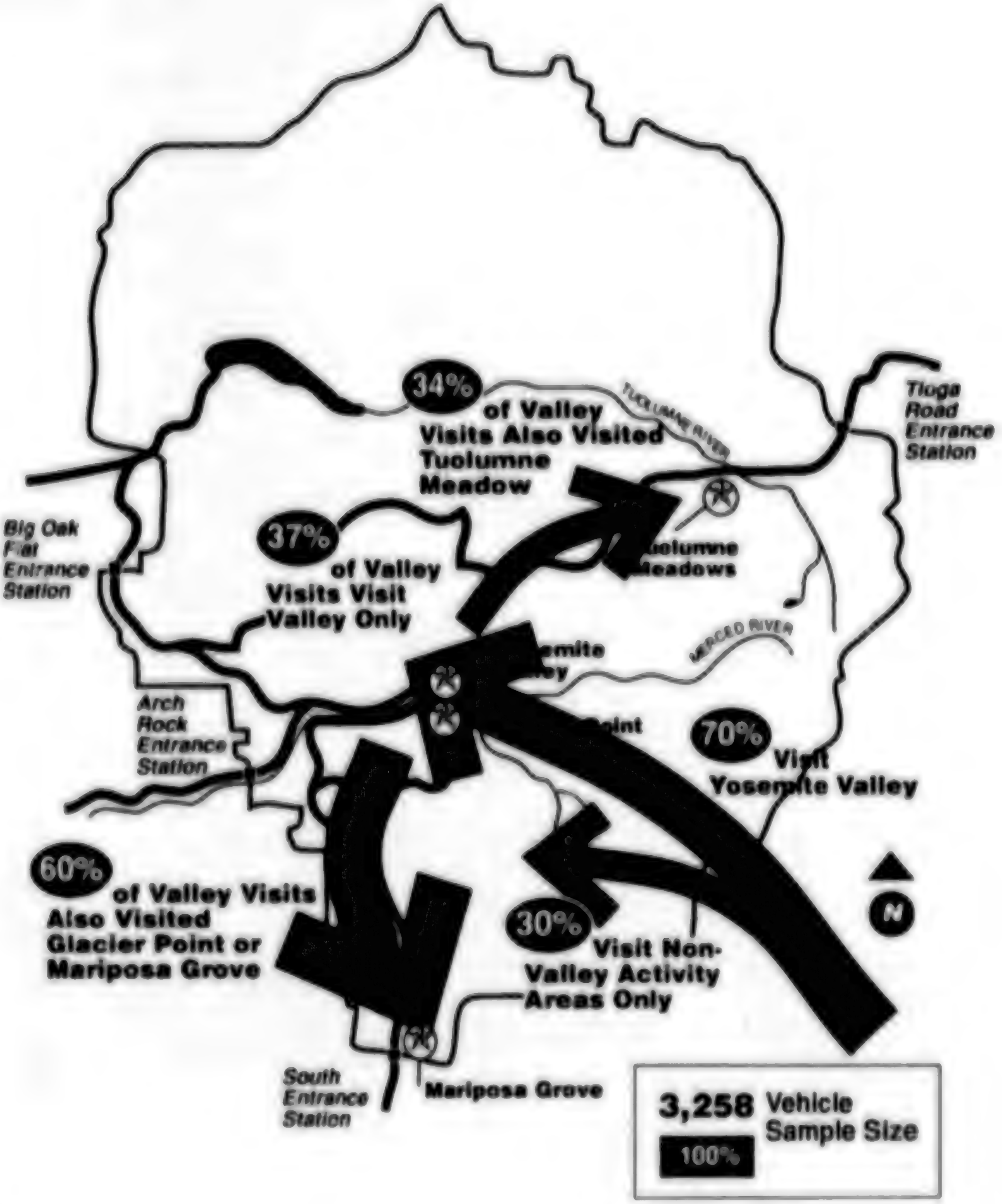

34% of Valley Visits Also Visited Tuolumne Meadow
Tuolumne River
Tioga Road Entrance Station
Big Oak Flat Entrance Station
37% of Valley Visits Visit Valley Only
Tuolumne Meadows
Merced River
Yosemite Valley
Glacier Point
Arch Rock Entrance Station
70% Visit Yosemite Valley
60% of Valley Visits Also Visited Glacier Point or Mariposa Grove
30% Visit Non-Valley Activity Areas Only
N
South Entrance Station
Mariposa Grove
3,258 Vehicle Sample Size
100%

Table ES-1: Daily Visitor Use Levels for Developed Areas in Yosemite

Developed Area	Day Use Visitors	Overnight Visitors
Yosemite Valley District		
Yosemite Valley	10,530	7,711
Cascades/Arch Rock	360	0
El Portal	765	0
Wawona District		
Chinquapin	810	0
Badger Pass	3,300	0
Bridalveil C.G./Summit Meadow	360	490
Glacier Point	7,650	0
Wawona	1,689	1,622
South Entrance Station	4,525	0
Mariposa Grove	3,850	0
Mather District		
Tioga Pass	540	0
Tuolumne Meadows	1,485	2,048
White Wolf	45	675
Tenaya Lake Area	720	0
Crane Flat	900	800
Tioga Road Campgrounds	0	1,250
Hodgdon Meadow	540	800
Foresta	90	30
Hetch Hetchy	1,080	0
Mather Station	0	120
Merced Grove	405	0
High Sierra Camps	0	168

Source: Yosemite National Park, General Management Plan

TRANSPORTATION IN YOSEMITE

On an average summer day in 1992, 6,500 to 7,000 vehicles entered Yosemite National Park. The south entrance station accommodated the greatest number of entries, with 27% of the 1992 peak season traffic. Arch Rock entrance, on the west, accounted for 24%, as did the north entrance at Big Oak Flat. The Tioga Pass entrance, serving travelers from the east, was only slightly behind the others at 22% of 1992 peak season entries. The Hetch Hetchy entrance, which does not provide access to the rest of the park, accounted for the remaining 2% of the 1992 summer vehicle entries into Yosemite. The park entrance volumes are shown on the attached map.

XVI

The south entrance near Mariposa Grove accommodates the highest number of park entries.

Tour buses are the fastest growing mode of travel to Yosemite. Tour bus access to Yosemite was first allowed in 1977, and by 1983 there were 3,021 tour bus trips. In 1992, there were 13,313 bus tours — an increase of 1,144 trips per year or an average annual growth rate of 17.9%. Based on an estimated average occupancy of 40 persons per trip, bus visitors have increased from 5% of all recreation visits in 1983 to 14% of all visits in 1992. Tour bus travel can be expected to continue increasing, driven by aging of the population, increased visitation by foreign travelers, and increased emphasis on alternative transportation modes.

The highest traffic volumes in the park are found in Yosemite Valley. In July 1992 the average one-way daily traffic volume on the Northside Drive leading out of the valley was 6,300 vehicles. On holiday weekends during the peak summer season, hourly volumes entering the park approached 1,100 vehicles. July two-way average daily traffic volumes on the other major park roads ranged from a high of 5,150 on Big Oak Flat Road southeast of Crane Flat to 2,950 on the Arch Rock entrance road.

For the typical visitor to Yosemite, driving through the park provides the primary means of experiencing its views and vistas. Even on the busiest summer days, travelers on the park roads encounter minor to moderate congestion, except at key activity areas and at the park entrance stations. As a result, driving into the park is usually a pleasurable experience, contributing to visitors' enjoyment of Yosemite. The ability to make informal stops along the park roads to take advantage of the unique and varied scenery contributes to each visitor's opportunity to experience the park on his or her own terms.

Transportation problems occur on a daily basis at the three major activity areas of Mariposa Grove, Tuolumne Meadows, and Yosemite Valley. Glacier Point, another significant visitor destination, experiences fewer problems because of the short duration of the typical visitor's stay. The capacity of the parking lot and the viewpoint appear to be in relative balance, so that the viewpoints and surrounding walking paths begin to feel crowded before the parking area is full. Based on an estimate of the duration of the typical visitor's stay, the parking area at Glacier Point and the road leading to the point can accommodate a greater number of visitors than the maximum specified in the general management plan.

The most significant aspects of the transportation problems and related resource impacts in each activity area are discussed below.

Mariposa Grove and Wawona

Mariposa Grove is served by a small parking area located within the lower grove. Parking demand exceeds the supply on nearly every summer day, causing the grove access road to be closed to visitor traffic in the late mornings and early afternoons. Visitors are directed to overflow parking areas located adjacent to the south entrance and seven miles to the north in Wawona. A shuttle bus service is provided between the parking areas and the grove. The use of the overflow parking area in Wawona and ridership on the shuttle bus system have increased tremendously. Parking in Wawona conflicts with visitor access to the store. Demand has grown to the point that strip

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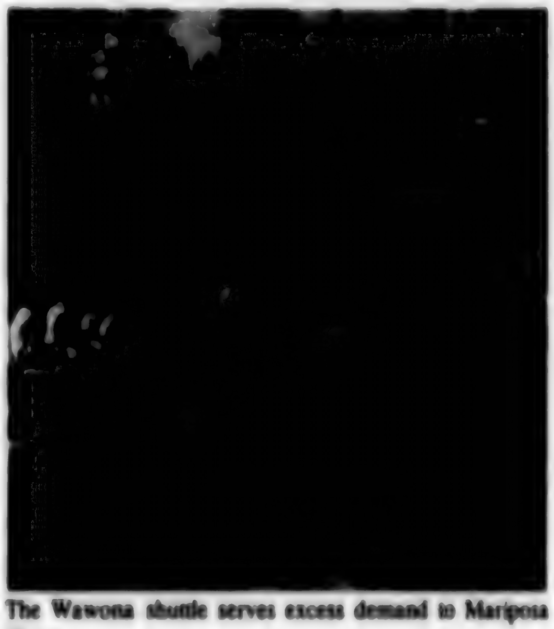
parking along the roadway is used, along with the formal parking areas near the store.

Traffic conflicts at the south entrance road have multiplied with the increase in visitation to the grove. The entrance station, parking for a restroom facility, a small overflow parking lot, and the control point for the grove access road, are all within a short distance of the heavily traveled three-way intersection, creating a nearly impossible traffic management situation. Conditions are worst when the grove access road is closed, requiring vehicles to turn back into the intersection they just traveled through.



The Wawona shuttle serves excess demand to Mariposa Grove.

Traffic safety problems arise when the two entrance lanes, which feed directly into the intersection, are open. Northbound vehicles using the right lane cross the path of vehicles bound for the grove from the left lane. Visitor confusion is a very significant problem due to the traffic conflicts and the varying means of access to the grove, depending on the closure status of the parking lot and access road.

The Wawona shuttle system has been effective in serving the demand for access to the grove from overflow parking areas, but the service can be irregular, causing delays and uncertainty for passengers. A schedule that is achievable, considering travel times and the potential for delays, should be developed and followed. A regular schedule would help to distribute demand over time and could reduce the number of buses needed to carry the current demand.

The travel patterns of some visitors making a stop at the grove as part of a trip to or from other areas of the park are duplicated by the shuttle system, resulting in increased vehicular travel and pollutant emissions. For example, a visitor trip involving a stop at Mariposa Grove enroute from the south entrance to Yosemite Valley would involve the following trip segments:

- private vehicle trip from south entrance to Wawona
- shuttle trip from Wawona to Mariposa Grove along the same route used by the private vehicle to reach Wawona
- shuttle trip from Mariposa Grove to Wawona along the same route
- continuation of the private vehicle trip to Yosemite Valley

The introduction of the shuttle connection between Wawona and the grove results in a net increase in vehicular travel for this specific travel pattern, since private vehicle travel is not reduced, but additional shuttle travel is required.

The parking area in the lower grove represents a threat to the continued vitality of the giant sequoia trees in the area and an intrusion of human influence in a rare and sensitive environment. The National Park Service intends to remove the parking from the grove and establish visitor access at a more appropriate location. The development of a new parking area away from the giant sequoia trees offers the opportunity to effectively manage visitor use, reduce the traffic conflicts associated with the grove access road, and remove the spillover parking impacts from the store lot and

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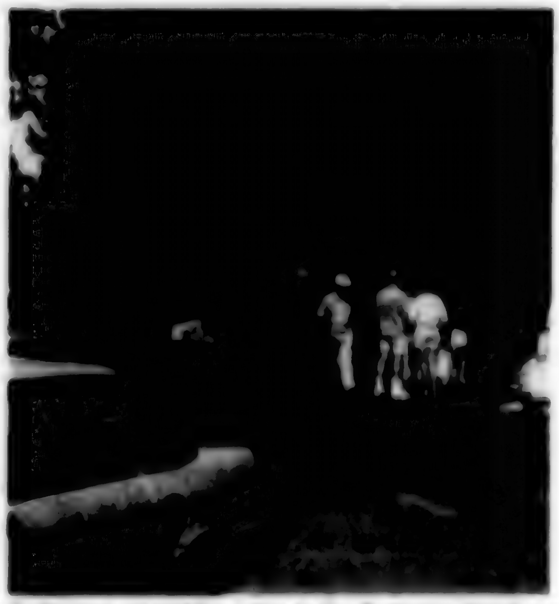
roadside in Wawona. Improvements to the south entrance station to resolve the current traffic conflicts and visitor confusion could be an additional improvement within the overall project to address grove access and parking.

Tuolumne Meadows

Tuolumne Meadows experiences traffic conflicts due to a shortage of parking within the meadows and at the various trailheads scattered along Tioga Road to the west. Additional vehicular circulation is occurring as visitors search for parking places, and parking is spilling out of formal areas and onto the shoulders of Tioga Road. Pedestrians cross at random locations and parking maneuvers disrupt the flow of through traffic.



A shortage of parking exists in the Tuolumne Meadows area.

The Tuolumne Shuttle, implemented in 1991, offers convenient service to overnight visitors if they can secure a parking space. Day use visitors to the area have as much trouble finding a parking spot near a shuttle stop as a spot at the activity areas they desire to visit. Very little information and promotion of the shuttle service is provided to day users, many of whom may not be aware of its availability. As a result, the shuttle has not been effective in reducing the impacts of informal roadside parking.

The Tuolumne River and Tuolumne Meadows provide one of the most significant subalpine nonforest wetland habitats in Yosemite. The meadows is an archeological district and the river through the meadows is designated under the Wild and Scenic River Act.

Significant habitat and wetland disturbance and soil compaction is occurring in the meadows because of dispersed visitor facilities, little interpretive information about the sensitivity of the area, and inadequate designated parking areas. Widespread informal, pulloff roadside parking and a proliferation of social pedestrian trails that crisscross fragile meadows and riparian areas to the river have resulted from the current parking shortage. Pulloff parking also destroys natural roadside vegetation and increases soil erosion from roadway runoff.

Tuolumne Meadows is more sensitive than meadows at lower elevations because the shorter growing season makes natural and assisted revegetation of disturbed areas more difficult. In addition, the impacts to the river edge environment caused by random social trail access are inconsistent with its wild and scenic designation.

The primary need in the Tuolumne Meadows area is for a centralized facility for parking and access to the shuttle system. The development of such a facility would also offer the opportunity to relocate some of the scattered visitor facilities which now fragment the meadow habitat and contribute to an inconsistent, strip development character.

Yosemite Valley

Traffic volumes on holiday weekends exceed the capacity of the Valley Loop roadway system. Congestion is a reoccurring problem at the village intersection and the Yosemite Falls intersection on the Northside Drive. A traffic management strategy that diverts vehicles bound for the Valley at El Capitan crossover is implemented on three to four days during the summer. Unfortunately, with the current arrangement it is not practical to sort day use traffic from the vehicles carrying visitors with overnight reservations in the valley. As a result overnight visitors must circulate through the west end of the valley waiting for access to be reopened, resulting in increased vehicular travel and emissions. A more restrictive traffic management strategy was used on some weekends in 1993. Visitors were directed away from Yosemite at the entrance stations during highly congested periods.

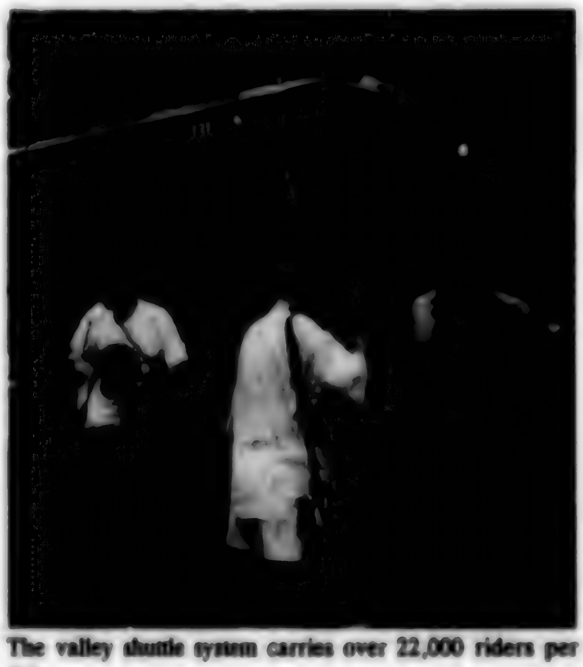
Yosemite Valley is a focal point for visitors and traffic.

The formal parking areas serving the most active visitor facilities are perpetually full. On summer weekends, parking spills out of the formal areas onto roadsides throughout the east end of the valley. Traffic and pedestrian conflicts are common during the periods of maximum visitation.

The valley shuttle system, which has operated in some form for over 20 years, provides frequent, free service for visitor and employee trips between destinations within the east end of the valley. An average of 22,600 passengers rode the shuttle system per day in August 1992. Annual ridership in 1991 totalled nearly 3.4 million. The service eliminates a substantial number of vehicular trips that would otherwise be made for circulation among the various visitor services and activity areas in the valley. However, the location of the primary day use parking area at the far eastern end of the valley results in traffic congestion that significantly affects the speed and reliability of the valley shuttle system. Crowding is a constant problem during peak demand periods, with buses occasionally passing up passengers waiting at stops.

Because it is the focal point of most park visits, the urbanization of Yosemite Valley is particularly intense. The valley contains four separate development centers: Yosemite Lodge, Yosemite Village, Ahwahnee Hotel, and Curry Village. Each year 2.5 million visitors and nearly 1 million cars, trucks, and buses crowd into the valley. Thirty miles of roadway bisect the valley floor, providing access to scenic, natural, and cultural attractions and to a scattered array of stores, restaurants, hotels, residences, and service buildings.

Directly associated with the structures are individual parking areas of varying sizes, which create dispersed and fragmented patterns of


The valley shuttle system carries over 22,000 riders per day.

development similar to strip commercial areas found throughout many towns and cities. This pattern of development significantly impairs the anticipated natural experience of park visitors and compromises sensitive natural environments unsuited for this type and intensity of use.

Other examples of spreading urbanism in the valley include an abundance of regulatory and informational signage, incompatible architectural styles, traffic congestion and roadside parking on major roads, crowding at major attractions, loss of natural environment, proliferation of social trails, and increasing conflicts among pedestrians, bicyclists, and vehicles. Impacts to the quality of surface waters in the valley occur from vehicular use within the park through the release of hydrocarbons via runoff or spills. In addition, increased vehicular traffic and informal road side parking disrupt wildlife access to surface waters and increase the potential for animal/vehicle conflicts. In the valley, the Merced River is effectively cut off on both sides by high volumes of vehicular traffic, parking areas, and buildings.

When the reductions in overnight accommodations called for in the concession services plan and general management plan are implemented, approximately 4,000 daily vehicle trips will be made into the valley by visitors going to lodging units, campsites, and day use activities. An equal number of outbound trips also will be made. Day use traffic will account for over 77% of these vehicle trips, as shown in table ES-2. Reduction or elimination of the day use trips has the potential to eliminate most of the negative impacts associated with private vehicles in the valley.

TRANSPORTATION ALTERNATIVES

Transportation system alternatives were developed to address the following functional requirements in Yosemite National Park:

- access to the Mariposa Grove
- circulation in Tuolumne Meadows and access to high-use activity areas along the Tioga Road west of Tuolumne Meadows
- access to Yosemite Valley
- circulation in Yosemite Valley

The needs of day use visitors, campers, backcountry users, and lodging guests were considered in the development and evaluation of the alternatives. The improvements considered included relocation and expansion of parking facilities, reduction of traffic conflicts through facility relocations and roadway improvements, remote staging areas serving activity centers, enhanced VTS bus services, and the implementation of at-grade and elevated fixed-guideway transit systems. Opportunities to

Table ES-2: Yosemite Valley Daily Vehicle Access and Egress Trips by Visitors

User Type	Daily Users	% by Bus	Number of Units	Party Size	Vehicle Occupancy	Number of Vehicles	Max. Veh. in Valley	Length of Stay (Nights)	Daily Vehicle Trips
Day	10,530	15	NA	2.9	2.9	3,086	1,750	0	6,172
Hotel	3,679	15	1,215	3.0	3.0	1,033	1,033	2.7	765
Camping	4,032	0	765	5.3	2.9	1,390	1,390	2.7	1,030
Backcountry	145	0	145	1.0	2.9	50	50	2.7	40
Total	18,386	NA	2,125	NA	NA	5,559	4,223	NA	8,007

Source: BRW, Inc.

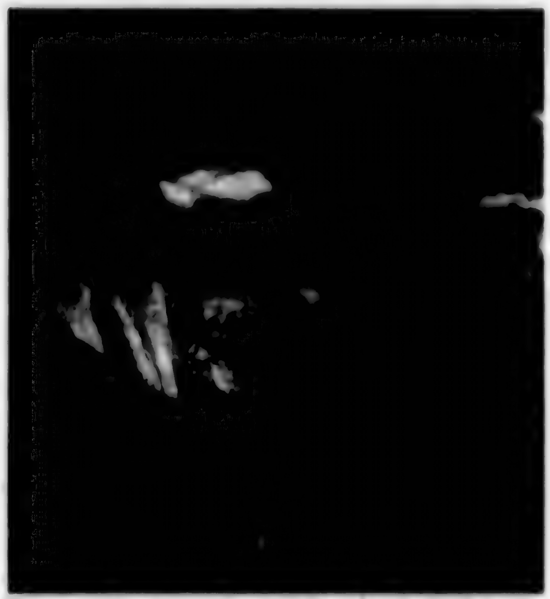
capitalize on the resource enhancement potential of visitor transportation systems by relocating visitor facilities and realigning transportation corridors out of sensitive areas were also identified.

Criteria were prepared to guide the development of transportation system alternatives, to focus the initial screening of alternatives to a smaller set of feasible options, and to direct the comparison of the feasible alternatives for Yosemite. The criteria were developed to respond to the study purpose as stated in the Intermodal Surface Transportation Efficiency Act, and to account for the unique transportation problems and environmental conditions at Yosemite.

Essential Requirements

To be considered for detailed evaluation, transportation improvement alternatives for Yosemite were required to have the following essential characteristics:

- be able to accommodate GMP visitation levels in all areas
- allow visitation to be managed to achieve GMP visitation levels
- afford a meaningful reduction in private vehicle travel
- avoid duplicating private vehicle travel patterns due to multiple visitor destinations within the park and travel between entrance stations
- allow current visitor use patterns to continue, including the ability to conveniently visit more than one area of the park in a one-day visit, allow trips through the park to be made by entering and exiting through different gates, and allow visitors to experience a full range of scenic and wilderness-oriented activities
- be compatible with local transportation plans
- reduce vehicle-related emissions
- reduce energy consumption associated with transportation
- maintain visual quality in key areas, especially the pristine view across the west end of the valley from Discovery View and the view into the valley from Glacier Point
- employ proven, available technologies for visitor transportation systems
- be capable of operating in a safe manner in the Yosemite environment
- comply with the requirements of the Americans with Disabilities Act
- allow unrestricted movement of wildlife across and along the transportation system



Transportation alternatives should maintain visual quality in key areas.

Finally, the alternatives had to represent potentially cost-effective solutions to transportation problems and resource impact concerns in Yosemite, considering the magnitude of the problems and the level of investment required.

The alternatives that were developed for initial and detailed assessment are listed below and illustrated on the maps located at the end of the Executive Summary.

Mariposa Grove Access

Three alternatives for accessing the grove that would seek to enhance visitor awareness and enjoyment and to restore and protect the ecosystem of the giant sequoias were identified for initial screening:

Grizzly Giant Staging Area. This alternative would involve removing the existing parking from the lower grove and developing a new parking lot and staging area east of the existing lot and south of the grove near the Grizzly Giant.

The new parking lot would provide 200 automobile and recreational vehicle (RV) spaces and 10 tour bus spaces. Also relocated to this area would be the grove tram and its related facilities and the drop-off/pickup for a courtesy shuttle to the Wawona Hotel and campground. The courtesy shuttle would be provided for the convenience of overnight visitors in the Wawona area and to reduce the vehicular travel associated with trips by Wawona visitors to the grove. Other facilities not required for resource management would also be relocated away from the grove. Linkages to existing trails in the grove as well as those external to the grove would be made. Visitors would access the upper grove either by the tram or on foot. The lower grove would be reached from the Grizzly Giant on foot only, following the existing hardened pathways.

Visitors would drive to the new staging area on the existing Mariposa Grove access road; however, just prior to entering the lower grove, a new two-way grove by-pass road would be constructed. This by-pass would be located south of the lower grove and would be approximately .75 mile long.

Alternative access to the new staging area could be provided by upgrading a U.S. Forest Service (USFS) road east and north of Goat Meadow. This two-way road would be approximately 3 miles long. The road, which was considered as an alternative access route in a draft development concept plan (DCP) for the grove, follows steep terrain. It is not explored in detail here, but could be evaluated as part of a new plan for the area. If used, the Goat Meadow access route would require the relocation of the south entrance station to the south of the Goat Meadow access road intersection with California Highway 41, near the park boundary.

The information on the accompanying map for Mariposa Grove access options provides an overview of the proposed service and the equipment required for the Wawona courtesy bus. Charts included in appendix 8 contain additional details for this alternative.

Goat Meadow Staging Area. This alternative includes the removal of the existing automobile parking lot from the lower grove and development of a new parking lot and staging area southwest of the grove in Goat Meadow, which is on USFS land. Visitors would be shuttled to the grove from the new parking lot via California Highway 41 and the existing Mariposa Grove access road.

The new parking lot would provide 290 automobile and RV spaces. A courtesy shuttle serving the Wawona Hotel and campground, regional tour buses, and the Goat Meadow shuttle would use the existing staging area at the edge of the lower grove to board and drop-off passengers. Connections with the grove tram would occur as they do today. With the Goat Meadow alternative, it would be necessary to relocate the south entrance station approximately .75 mile south to a location south of the Goat Meadow access road. The existing grove access road would be closed to private vehicular traffic year-round.

The information on the accompanying map for Mariposa Grove access alternatives provides an overview of the Goat Meadow shuttle and the Wawona courtesy bus service. Additional details for this alternative are presented on charts included in appendix 8.

xxiii

Buses could provide courtesy shuttle service to Mariposa Grove from Wawona.

Wawona Staging Area. This alternative includes the removal of the existing automobile parking lot from the lower grove and development of a parking and grove shuttle bus staging area within the Wawona district. Several alternative staging area sites in the Wawona district were examined. Access to Mariposa Grove would be via a shuttle bus serving the staging area and the Wawona Hotel and campground, or by tour bus. All buses would pick up and drop off passengers at the existing staging area in the lower grove, where connections to the grove tram would be made. Within the Wawona district, parking would be provided for 350 cars and RVs. Although not essential to this alternative, the south entrance station could be relocated south to reduce traffic conflicts at the grove access road intersection with California Highway 41 and to accommodate expanded visitor information, orientation, and reservation services. Information and orientation would also be required at the Wawona staging area.

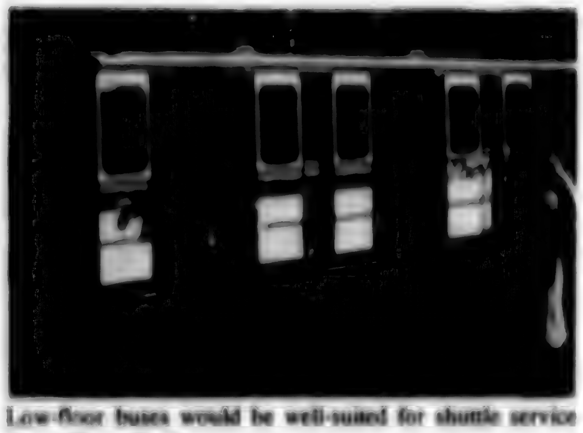
The map for Mariposa Grove access options, located at the end of the Executive Summary, provides a summary of the Wawona shuttle service and vehicle fleet included in this alternative. Additional details for this alternative are summarized on charts included in appendix 8.

Tuolumne Meadows/Tioga Road Circulation

Two alternatives to improve Tuolumne Meadows and Tioga Road circulation were developed for detailed analysis. Each included the development of a new staging area east of the meadows at a gravel pit located north of Tioga Road. The staging area would act as the primary access point for two shuttle services. One shuttle would serve circulation within the Tuolumne Meadows area, with a route similar to the current shuttle. The second shuttle would provide access to the trailheads located along the Tioga Road west of the meadows to Olmstead Point. To facilitate boarding and alighting, low floor buses would be used along both routes, with modifications to accommodate backpacking gear, climbing equipment, and other recreational items.

The alternatives differed in the treatment of visitor parking along the route. The first alternative was a mandatory shuttle system. The existing parking areas in the meadows and along Tioga Road would be removed. Enforcement would be required to curtail parking along the roadsides at activity areas. Parking would remain in the campground, lodge, Dog Lake trailhead lot, and wilderness permit lot for overnight visitors. All other day use visitors, including those arriving by tour bus, would be required to park in the staging area.

The second alternative was a voluntary shuttle system, which assumed that the existing formal parking areas along the road would remain. Prohibition of roadside parking and parking in unmarked, informal areas was also assumed as part of the voluntary shuttle option, with the staging area and shuttle service taking the place of overflow parking. Careful delineation of the parking areas and active enforcement would be required to eliminate resource damage due to roadside and spill-over parking. Tour bus parking would be located in the new staging area. The operations of both alternatives could be enhanced with a west end staging area near Tenaya Lake. However, no acceptable location for such a staging area has been identified to date.



Low-floor buses would be well-suited for shuttle service along Tioga Road.

The gravel pit site could accommodate visitor services and administrative functions now located within sensitive areas of Tuolumne Meadows. Depending on the configuration of the site and the ancillary facilities to be located there, a portion of the new development could fall within lands designated as wilderness. Although impacted by the gravel pit, development within this portion of the wilderness area would require congressional action to change the wilderness boundary. Considering the potential opportunity to eliminate impacts of visitor and administrative facilities to areas near or within the wild and scenic river designation and in sensitive natural habitats, a wilderness boundary change in the gravel pit area may be acceptable.

The maps for the Tuolumne Meadows/Tioga Road access alternatives, located at the end of the Executive Summary, provide descriptions of the service and equipment for both options. Additional details for each alternative are presented on charts included in appendix 8.

Yosemite Valley Access and Circulation

A broad range of options to reduce the presence and impact of private vehicles in Yosemite Valley were evaluated. The analysis considered the following:

- Should both overnight and day use visitor trips be diverted to a visitor transportation system (VTS)?
- Should staging areas be located near or within the valley, at remote sites in the park, or at sites outside the park boundary?
- What routes can best serve visitor transportation needs within the valley?
- What technologies are most appropriate for use in the unique environment of the valley?

VTS alternatives to serve overnight visitors to the valley were considered, but not carried forward for detailed evaluation. The following factors led to the decision to plan for overnight visitors to continue to travel to their overnight accommodations in private vehicles:

- Analysis of travel patterns revealed that 77% of the vehicle trips to and from the valley are associated with day use visits (see table ES-2).
- High costs of equipment and vehicles to carry baggage and camping gear
- Expected visitor resistance to being separated from luggage and equipment
- Potential for loss and/or damage to camping equipment and baggage
- Need for and cost of overnight security in remote staging areas

Two concepts for intercepting day use private vehicle traffic and transferring passengers to a visitor transportation system were developed and evaluated.

- A system of staging areas in remote locations that would intercept traffic on each route to the valley. Visitors would be carried on buses to the valley, where they would transfer to a circulator system to reach individual destinations within the valley.

- A single staging area located in an appropriate site within the valley that would be served by a shuttle connector for access to the Yosemite Village area, where visitors could transfer to a circulator system similar to that proposed in the previous concept.

Two alternative remote staging area plans were developed to represent the range of potential options within this concept. One plan located staging areas outside the park near the south entrance, in El Portal near the west entrance station, and near the north (Big Oak Flat) entrance station. It was assumed that travelers to the valley from the east entrance (Tioga Pass) would be directed to the north staging area.

The second plan located staging areas within the park at Badger Pass and Crane Flat and outside the west entrance in El Portal. The Crane Flat staging area was assumed to serve Tioga Pass traffic bound for the valley. The two remote staging area concepts are illustrated on the accompanying map.

Table ES-3 compares the remote staging area alternatives with an in-valley staging area. The in-valley staging area was assumed to be located at Taft Toe for this comparison.

The remote staging concept would require between 7 and 10 additional acres for parking development, 40 to 62 additional buses, $10.8 to $16.5 million in additional construction and equipment costs, and $12.0 to $18.5 million in additional operating costs per year. The total cost increase for remote staging compared to in-valley staging ranges from $13.2 million to $20.2 million on an annualized basis.

Table ES-3: Comparison of Remote and In-Valley Staging Areas for Yosemite Valley Access

Comparative Measure	Staging Areas Outside Park	Remote In-Park Staging Areas	Taft Toe Staging Area
Number of Parking Spaces	2,720	2,470	1,840
Number of Buses Required	83	61	21
Construction and Equipment Cost	$27,337,000	$21,692,000	$10,864,000
Annual Operating and Maintenance Cost	$21,639,000	$15,190,000	$3,158,000
Average Delay to Through Travelers	2 hrs. 12 min.	1 hr. 37 min.	23 min.

Source: BRW, Inc.

Note: Accommodates day use only. Costs represent total costs (contingency, planning and supervision percentages applied where appropriate) for vehicle fleet and parking spaces only. Does not include valley circulator VTS.

Remote staging areas would offer a potential benefit by reducing private vehicular travel throughout the park. However, significant decreases in private vehicle use would be achieved only for visitors who enter and exit Yosemite via the same gate and do not visit other activity areas in the park. Only 21% of the current visitors to the valley make this type of visit. Most valley visitors would make private vehicle trips along the same routes traveled by the shuttle systems after visiting the valley, offsetting the private vehicle travel savings associated with remote staging areas.

Other considerations favoring an in-valley staging area strategy include:

- Remote staging areas would limit visitors' ability to stop at features along the park roadways for sightseeing and other activities.
- Potentially higher levels of particulate and nitrogen oxide (NOx) emissions would be generated by high volumes of bus travel on park roads.[1]
- Increased noise levels on park roads and in the valley would be associated with high volumes of bus travel.
- Complex visitor communications and management system requirements would exist at multiple sites to sort non-valley, valley day use and valley overnight traffic. Similar functions would need to be accommodated at the entrance to the valley as well as the remote staging areas.

As a result of these factors, the analysis of VTS options for Yosemite Valley assumed an in-valley staging area site.

Several staging area site alternatives within Yosemite Valley, shown on the Yosemite Valley Staging Options map, were identified and analyzed:

- Pohono Quarry
- Valley View
- Bridalveil Falls area
- Yellow Pine
- Camp 6 (Sentinel Bridge)
- Curry Orchard (current primary day use parking)
- Old Curry dump site
- Taft Toe (El Capitan crossover)

The Camp 6, Curry Orchard and Curry dump sites offer little opportunity to reduce private vehicular traffic because of their location toward the east end of the valley.

The Taft Toe site offers several advantages over the other candidates in the western end of the valley, including:

- No impact to sensitive views into or within the valley
- No impact to Merced River flood plain or wild and scenic river designated area
- Adequate land area to accommodate surface or structured parking and additional visitor services and administrative facilities
- Most convenient access from and egress to the parkwide road network
- Convenient visitor access management for overnight and day users

Private vehicular travel, bus travel (assuming that a shuttle connection between the staging area and Yosemite Village and Yosemite Lodge would be provided by buses) and VTS capital and operating costs for the Taft Toe site were compared to those for the Yellow Pine and Pohono Quarry sites. Table ES-4 shows the key findings of this comparison.

The Pohono Quarry site would minimize private vehicle travel, since it would intercept all day use valley visitors entering from the north and west at the west end of the valley. The Yellow Pine site would generate the highest volume of private vehicle travel, since all visitor trips would traverse the valley loop as far east as Sentinel Bridge on their exit route from the valley. The Taft Toe site would generate private vehicle travel volumes which would be substantially lower than those for Yellow Pine, although higher than those for Pohono Quarry.

The private vehicle travel reductions possible with the Pohono Quarry site would be achievable only with an expanded VTS fleet and higher VTS operating costs. A bus-based VTS connection from the staging area at Pohono Quarry would require over 5,200 daily bus miles, compared to 3,200 for Taft Toe and 2,000 for Yellow Pine.

Higher particulate and NOx emission rates of diesel buses would offset emission reductions from private vehicles, potentially resulting in poorer air quality for a quarry staging area site than for a Taft Toe site. Future alternative fuels advances for buses could reduce the undesirable emissions associated with a bus shuttle system for any of the staging area sites and could reduce the emissions disadvantage of the Pohono Quarry site relative to Taft Toe.

A guideway technology employing electrically powered vehicles would eliminate the noise and emissions impacts of a Pohono Quarry staging area. Such a system would be 2.5 miles longer for the Pohono Quarry site than for Taft Toe. The capital cost increase for a guideway connection from the quarry, compared to Taft Toe would be $78.2 million. Annual operating costs would also be substantially higher for a fixed guideway system serving the quarry.

Although the Pohono Quarry offers the potential for significant reductions in private vehicle travel, the vehicular travel reduction benefits of this site would be balanced by negative impacts to the valley vista from Discovery View and higher development costs for parking due to the need for a parking structure. Increased management staff and facilities would be required to confirm overnight reservations and limit day use vehicle access at El Capitan

Table ES-4: Comparison of Valley Staging Areas

Comparative Measure	Pohono Quarry	Yellow Pine	Taft Toe
Private Vehicle Vehicle Miles Travelled Per Year in Valley	905,538	7,582,854	3,325,560
Bus Vehicle Miles Travelled Per Year in Valley	1,408,900	531,800	877,100
Total Vehicle Miles Per Year	2,329,800	8,113,300	4,202,000
Bus Fleet Capital Cost	$6,525,000	$3,480,000	$4,567,500
Bus Fleet Operating Cost Per Year	$5,072,100	$1,914,400	$3,157,700

Source: BRW, Inc.

Note: Assumes shuttle connection between staging area and Yosemite Lodge via Camp 6 using bus technology. Accommodates day use visitors only. Bus fleet cost represents total cost (contingency percentage applied).

crossover. There would be greater impacts to the Merced scenic river corridor, and higher capital and operating costs for the visitor transportation system.

Considering its advantages and the drawbacks of the other potential sites, for the purposes of this study, Taft Toe was assumed to be the site for a staging area for day use visitors to Yosemite Valley.

The final valley visitor access alternatives consisted of a staging area and a transportation system comprised of two shuttle routes. Day use visitors arriving by private vehicle would be intercepted at a staging area located at the El Capitan crossover in the Taft Toe area. Tour buses bringing day use visitors into the valley would proceed to Camp 6, where a bus parking area would be provided. As an option, day use tour bus passengers could be dropped off and their buses parked at the Taft Toe staging area.

Overnight lodging guests and campers would drive their vehicles to their accommodations, where they would remain parked for the duration of the visitors' stay in the valley. Tour buses with overnight guests would drop passengers off and pick them up at the lodging facilities and then park, either close to the lodging area, at Camp 6, or at the staging area. The staging area could include an overnight visitor check in facility, where reservations could be confirmed. Visitors awaiting accommodations on a stand-by basis could be served at this facility. The valley visitor transportation system could be clearly explained to all visitors.

The first shuttle route (valley connector) would provide service between the staging area and the Yosemite Lodge/Yosemite Falls area via the Southside Drive and the Sentinel Bridge crossover. Stops would be made at the major activity points along the way in each direction. The second shuttle route (valley circulator) would serve the east end of the valley, traveling between the Ahwahnee Hotel and Happy Isles Nature Center, using the Sentinel Bridge crossover and Southside Drive. A transfer point between the two routes would be provided in the vicinity of Camp 6, and each route would serve the village. Day use tour bus passengers would have access to both routes at the Camp 6 transfer station.

Four technology options were developed for each shuttle route; standard bus, articulated bus (passenger trams could also be considered), light rail transit (LRT), and an elevated people mover using group rapid transit (GRT) technology. light rail transit would be constructed at grade, most probably adjacent to the existing roadway, although it would be possible to construct the system in the roadway, where it would share the lanes with private vehicular traffic. LRT vehicles would be powered by electricity delivered to the vehicle by an overhead wire.

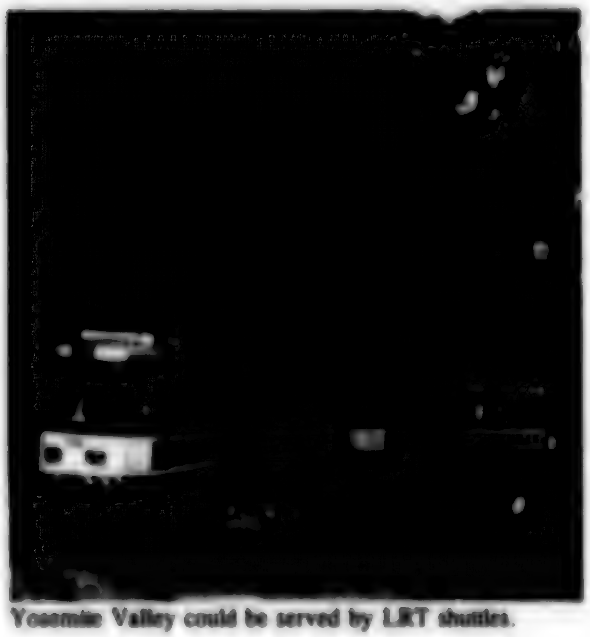
GRT options would involve the construction of an elevated guideway, 16 to 17 feet above the valley floor. GRT vehicles would be electrically powered by a special contact rail located in the guideway, or by linear induction motors which would operate with electrical current within the guideway. The GRT system would require elevated stations, with elevators for disabled access and stairs or escalators for general visitor access.

The system of day use visitor access and circulator service for all visitors would require supporting actions to be most successful. Along with the new staging areas and the VTS routes, the following improvements and modifications to current operations would be required:

- Remove visitor parking from all activity areas except for reserved parking spaces at lodging sites and campgrounds. Limited parking would be provided for disabled access. Short-term parking for campers shopping at the Curry Village store could be considered in the Curry Orchard. Overnight visitors would be informed of parking limitations and the use of the valley shuttle system after they had reached their overnight destination.

- Provide more services at Curry Village to direct visitor-related demand away from the store in Yosemite Village.

- Relocate some or all visitor center functions to the Taft Toe staging area. At a minimum, provide visitor information, orientation and interpretation, and restroom facilities at the staging area. Confirmation of overnight reservations would be required for lodging, camping, and backcountry users. Day users will also need to check in if reservations are implemented for valley day use. Fast food services, concession-operated gift sales and service station functions could be located at the staging area. Bike rentals could be provided to reduce shuttle demand. For the LRT and GRT options, vehicle storage and maintenance would be located at Taft Toe. The bus alternatives could use Taft Toe or another location for vehicle storage and maintenance.

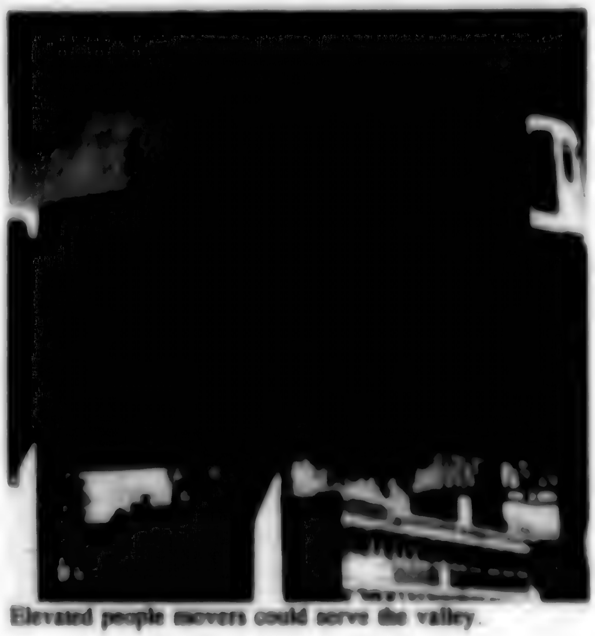


Yosemite Valley could be served by LRT shuttles.

- Relocate camping and the stables from the north side of the Merced River to reduce habitat fragmentation and streambank damage and provide wildlife access to the stream from the north. The river campgrounds and the group camp would be affected by the relocation, which would allow closure and removal of Stoneman Bridge. Shuttle alternatives that would allow the existing facilities to remain are shown as staging options in a series of maps included at the end of the Executive Summary.

- Close the Northside Drive between Sunnyside Campground and El Capitan crossover to visitor traffic. Closure of the Northside Drive would also be possible from El Capitan crossover to Pohono Bridge if the Southside Drive was upgraded to four lanes. This would remove visitor traffic from all of the north side of the valley except for the short stretch between Yosemite Lodge and the Ahwahnee Hotel. The roads on the north side could be retained for NPS needs and bicycle traffic only.

The Yosemite Valley VTS Alternative map, located at the end of the Executive Summary, summarizes the key aspects of each of the VTS options. Appendix 8 includes charts which provide additional details for each alternative.



Elevated people movers could serve the valley.

EVALUATION SUMMARY

The charts included at the end of the Executive Summary provide a convenient comparison of the alternatives against six evaluation categories. The following paragraphs highlight the most significant results of the evaluation process.

xxx

Mariposa Grove

The three alternatives would substantially reduce impacts to the resources from vehicles and the influence of automobiles on the visitors' experience in the lower grove. The Grizzly Giant option would have the greatest benefit, because it would remove all bus activity from the area, as well as all visitor parking from the grove. Each of the alternatives would contribute to reducing visitor confusion and frustration by providing a centralized parking area and a consistent means of accessing the grove. Much larger parking lots would be required for the Goat Meadow and Wawona alternatives, due to lengthened visitor stays. Visitor convenience would be less for these two alternatives, as well.

The Goat Meadow alternative would result in more vehicle travel within the park due to bus traffic and a substantial number of auto trips which would double back along the route to the staging area. The Wawona site would reduce vehicle miles traveled, but it could still cause an increase in particulate and nitrogen oxide emissions from buses. The Grizzly Giant alternative would be the least costly, followed by Goat Meadow and Wawona. The costs for each alternative are presented in table ES-5.

Each of the alternatives would involve the construction of new facilities, resulting in the potential for disturbance to habitat and wildlife. There could be temporary impacts to local water and air quality and to the visitor experience. The Goat Meadow option would minimize the potential impacts within the park and is partially located on previously cleared ground.

Tuolumne Meadows

The primary advantages of developing a centralized parking area, as proposed in both alternatives, include improved access for day use visitors, particularly to the shuttle system; a reduction in vehicle circulation associated with visitors searching for parking spots; substantially reduced impacts to vegetation and soils from social trails and road-edge damage from parked cars; enhanced character of the area by a reduction in development intensity; and reduced pedestrian and vehicular conflicts. The development of a new staging area at the gravel pit site also would afford the opportunity to relocate the dispersed facilities now serving visitors in the Tuolumne Meadows area to a location which would offer improved visitor access, adequate space to include orientation and

Table ES-5: Cost Summary for Mariposa Grove Access Alternatives

Cost Element	Goat Meadow Staging Area	Wawona Staging Area	Grizzly Giant Staging Area
Construction and Equipment (millions)	$8.8	$8.7	$5.3
Annual Operating and Maintenance (millions)	$1.1	$1.7	$0.4
Annual GMP Visitors	854,700	854,700	854,700
Annualized Cost Per Visitor	$2.15	$2.89	$0.94

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

interpretive facilities, and a reduction in the haphazard strip development character of the prime resource area of the meadows.

The mandatory shuttle system would have the greatest potential to protect the habitat of the area by focussing all parking in one easily managed location. The disadvantage of this alternative is that it would require all visitors from the west to drive past the activity areas to reach the staging area. As a result, it would be less convenient for many visitors and could cause an overall increase in vehicular travel. The voluntary shuttle system would require more extensive parking enforcement to prevent spill-over parking near the remaining formal parking lots along Tioga Road. The mandatory shuttle alternative is substantially more costly, involving the construction of a larger new parking area and the operation of a larger bus fleet. Table ES-6 provides a summary of the costs of the two Tuolumne Meadows shuttle options.

Yosemite Valley Access and Circulation

The proposed valley alternatives all offer significant potential benefits to visitors, resources, and park management. Visitor access would be improved by providing a centralized parking facility with clear information and efficient access. The proposed alternatives would eliminate the need for all day users to negotiate the confusing valley road network in search of scarce parking spaces. Visitor experience would be enhanced by removing the disrupting influence of traffic congestion, roadside parking, and scattered formal parking facilities. Transit service levels would be very good, with short wait times and reduced crowding on vehicles compared to the existing shuttle system. The reliability of service would be improved by reducing delays from traffic congestion.

The valley's resources would benefit from the ability to remove visitor and VTS traffic from long sections of the Northside Drive, affording improved wildlife access to the Merced River and reduced streambank damage from over use by visitors. Vehicular traffic would be reduced by over 77% (see table ES-2, page ES-11), decreasing emissions and lessening the potential for contamination of the Merced River from particulate matter and accidental fuel spills.

Park management would be facilitated by focussing day use parking in a central location and by eliminating the present need for traffic control staffing during peak traffic conditions. Management of visitation to GMP levels would be simplified by limiting the supply of day use parking to the number of spaces needed to support the prescribed visitation. If a day use reservation system were implemented, the proposed staging area site would facilitate the confirmation of reservations for both day and overnight visitors.

All of the alternatives would require a substantial area for parking at Taft Toe. While over 1,800 new parking spaces would be developed at Taft Toe to accommodate day users, an equivalent number of parking spaces could be removed from more sensitive areas in the east end of the valley. The site would not be visible from the key viewpoints at Discovery View and Glacier Point and could be screened from the Merced River by locating the facility away from the Southside Drive. The development could be located out of the Merced river flood plain and would not disrupt critical meadow and meadow edge habitat. Site- specific archeological surveys would be required prior to any ground disturbance activities for construction of a staging area.

The service characteristics and visitor management opportunities for the valley alternatives are similar, with the exception of the need for stairway and elevator access to elevated stations for the GRT alternative. The elevated stations would make access to the systems less convenient, particularly for visitors with recreational equipment. The bus options would influence visitor experience by increasing bus noise levels and by resulting in more frequent vehicle arrivals and an almost constant shuttle bus presence. Specially configured buses could be used to reduce noise. Future developments in battery and hydrogen fuel cell technology could eliminate bus engine noise. The overhead wires

Table ES-6: Cost Summary for Tuolumne Meadows Shuttle Alternatives

Cost Element	Mandatory Shuttle System	Voluntary Shuttle System
Construction and Equipment (millions)	$16.7	$13.4
Annual Operating and Maintenance (millions)	$1.4	$1.0
Annual GMP Visitors	517,644	517,644
Annualized Cost Per Visitor	$5.75	$4.46

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

which provide power for the LRT alternative would disrupt some foreground views and the views of some features from points along the guideway. The elevated guideway of the GRT alternative would have a major impact on foreground and longer-distance views and would most likely be visible from Glacier Point.

The resource impacts of the options are similar, although the LRT and GRT options would involve major construction activity within the archeological district and the potential for intermittent impacts to air and water quality associated with construction. These alternatives would require a large maintenance facility located within the valley (probably at the staging area), while the bus maintenance facility could be located out of the valley (if substantial increases in operating costs were acceptable).

The bus alternatives would be the least costly to implement and operate, but would require a larger operating staff. The highest cost option would be group rapid transit, followed by light rail transit. Both of the guideway transit options are significantly more costly than the bus alternatives. The LRT and GRT options would be the most complex to implement, requiring more extensive environmental documentation and specialized expertise for design and construction. Electrification upgrades would be required in the valley to deliver the necessary amount of power to both the LRT and GRT options. The bus alternative could serve as an initial step in a multi-phase development plan involving later development of a fixed-guideway system. Because of the very high ridership potential for the proposed systems, the cost per visitor is quite low compared to systems in other settings, ranging from about $1.40 per visitor for the bus options to over $10.50 per visitor for the GRT option. Table ES-7 summarizes the cost for two bus alternatives and the LRT and GRT options. A mix of bus and guideway systems could also be implemented with a corresponding reduction in costs.

RELATED VISITOR MANAGEMENT MEASURES

The majority of the transportation impacts in the major activity areas in Yosemite are associated with day use visitation. Summer season visitation is estimated to be at or near the prescribed levels on a daily basis at Mariposa Grove and on peak summer weekends in the valley and Tuolumne Meadows. The enforcement of GMP visitation goals is difficult in the valley and at Tuolumne Meadows due to the dispersal of parking areas and the lack of an effective control point where entries and exits can be monitored. Mariposa Grove offers a more manageable situation, with a parking lot of

Table ES-7: Cost Summary for Yosemite Valley VTS Alternatives

Cost Element	Standard Bus	Articulated Bus/ Passenger Tram	Light Rail Transit	Group Rapid Transit
Construction and Equipment (millions)	$26.4	$26.2	$279.1	$438.5
Annual Operating and Maintenance (millions)	$4.7	$3.3	$5.9	$5.3
Annual GMP Visitors	4,049,502	4,049,502	4,049,502	4,049,502
Annualized Cost Per Visitor	$1.76	$1.38	$7.05	$10.51

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

limited size and the opportunity to provide supplemental shuttle service with a capacity matched to the GMP visitation goal.

A day use reservation system would aid in the management of visitor use; however, without a means of checking entering traffic to confirm reservations and a place for safe and efficient diversion of visitors to areas of lower use or out of the park, implementation of a reservation system would not be practical. Controlled access points served by parking areas sized to correspond to the applicable visitor volume would make a reservation system workable. The system could reduce the number of visitors turned away from activity areas and would cut down on unnecessary travel into and through the park, especially if information could be provided to visitors as they travel on the major access routes toward Yosemite.

Intelligent vehicle/highway system (IVHS) technologies could be applied to the development of visitor management concepts, including reservation systems. Advance traveler information systems using signs, radio or in-vehicle terminals could be used to advise potential visitors of the up-to-the-minute status of lodging, camping, and day use reservation availability in Yosemite. These systems would be most effective for Yosemite visitors if located at the intersections of roads leading to the park with California Highway 99 and U.S. 395. Such traveler information systems, in combination with reservation centers located at the major access points to the roads serving Yosemite, would allow visitors to plan a Sierra vacation itinerary based on the availability of access to the park. A cooperative association of Yosemite National Park and the surrounding counties of Merced, Mariposa, Tuolumne, Mono and as well as the California Department of Transportation and the U.S. Forest Service, has been formed to improve visitor information regarding overnight accommodations, park access and other recreational opportunities, using Intelligent Vehicle Highway Systems.

Providing current information to visitors along California Highway 99 and U.S. 395 would afford visitors opportunities to change their travel routes, park entry points, or overnight plans. Providing information on park accessibility and the ability for visitors to make next-day reservations could eliminate unnecessary travel and support the economic development objectives of the communities.

The gateway communities now serve as overflow overnight lodging resources for visitors who would otherwise stay in the park. As visitation to Yosemite increases, more visitors would be expected to stay overnight in the gateway communities. Some trips to and from the park by visitors staying in the gateway communities could be served effectively by shuttle systems. Shuttle services could be provided by an association of lodging operators as an incentive to visitors. The successful implementation of shuttle systems serving overnight guests outside the park could reduce the number of parking spaces required for day users at the valley staging area to some degree.

IMPLEMENTATION AND FUNDING OPTIONS

The staging area and VTS improvements analyzed in this study would take several years to be planned, designed, and constructed. In the interim, the number of days with unacceptably high levels of congestion is likely to increase. Some short term improvements to better serve visitors are possible in Yosemite Valley and at Mariposa Grove. Without a better system of formalized parking it will be difficult to improve the effectiveness of the shuttle service in Tuolumne Meadows.

Mariposa Grove Staged Improvements

The existing visitor confusion and traffic conflicts associated with grove access could be reduced through improved signage and the development of a more reliable shuttle schedule. Signage improvements would include signs at the south entrance to give visitors advance warning that the road to the grove is closed. Similar signs are needed for northbound traffic in Wawona. Although not essential, the south entrance station could be relocated south to reduce traffic conflicts at the grove access road intersection with California Highway 41 and to accommodate expanded visitor information, orientation, and reservation services. Signs should also be provided at Wawona to clarify the location of the shuttle boarding area and the schedule of service for the shuttle. A specific vehicle assignment should be made to the Wawona shuttle system. A schedule should be developed to provide for vehicle arrivals at regular intervals. The schedule should be communicated to visitors. Service to the campground should be provided on a scheduled basis or eliminated so that campground visitors do not wait for Mariposa Grove shuttles that might not arrive.

Yosemite Valley Staged Improvements

Visitor access could be improved within the valley by developing Camp 6 as a formal day use visitor parking area. By providing a paved and striped lot, the capacity of the facility could be improved substantially. Access could be provided from the Sentinel Bridge crossover, reducing traffic at the heavily congested village intersection. The directional sign at the Sentinel Bridge intersection on the Southside Drive should be changed to direct Yosemite Lodge traffic and vehicles bound for the day use parking at Camp 6 over Sentinel Bridge. The Camp 6 parking area could reduce demand on the overloaded shuttle system by providing pedestrian access to the village for day users.

The long term VTS recommendations for the valley focus on the elimination of day use vehicle trips and simplification of the existing valley shuttle bus system for more efficient service. Along with the service improvements, visitor use of some existing valley roads and bridges could be eliminated and visitor facilities could be relocated to allow meadow and habitat resource restoration.

Implementation of the long-range transportation system in Yosemite could be accomplished in three stages as outlined below and illustrated on the maps located at the end of the Executive Summary.

Stage I

- Develop Taft Toe staging area, including relocation of visitor information center from Yosemite Village.
- Implement valley connector shuttle along Southside Drive (or modified to be raised out of meadows along south hillside) to connect the Taft Toe staging area with Yosemite Lodge.
- Implement valley circulator shuttle between the Ahwahnee Hotel and Happy Isles via

Yosemite Village, Housekeeping Camp and Curry Village.

- Develop shuttle transfer point and tour bus parking at Camp 6.
- Relocate main valley visitor store to Curry Village. Maintain village store for employees and some visitors at Yosemite Village.
- Eliminate visitor traffic on the Northside drive between El Capitan crossover and Yosemite Lodge. Maintain emergency and service vehicle accessibility. Use road for pedestrian and bicycle circulation.

Stage II

- Relocate upper and lower river campgrounds if suitable sites can be identified; restore campground areas to natural conditions.
- Eliminate all traffic on Stoneman bridge road between Curry Village and the Yosemite Village intersection.

Stage III

- Widen the Southside Drive to four lanes from Pohono Bridge to the El Capitan crossover.
- Eliminate visitor traffic from Northside Drive between El Capitan crossover to Pohono Bridge.
- Provide designated El Capitan viewing and climber access parking area on north side of El Capitan crossover.
- Relocate stables to south of Merced River if a suitable location can be found; restore stables area to natural condition.
- Relocate group camp and North Pines campgrounds to area near relocated river campgrounds if a suitable site can be identified. Restore area to natural conditions.
- Terminate shuttle traffic at Happy Isles or at existing Mirror Lake shuttle stop.

The implementation of any of the VTS alternatives evaluated in this study would require new sources of funding. Potential sources include funding provided in the Intermodal Surface Transportation Efficiency Act; line-item appropriations as part of the NPS budget; participation by the park concessioner; and user charges, which would be collected as part of the entrance fee. The systems would work best if fares were not charged. Direct user charges are not recommended. On a per-visitor basis, many of the alternatives are within the range of $1.50 to $5.00. This funding level could be generated through modest increases in entrance fees. The fixed guideway VTS options in the valley would require funding from sources other than users. Investment in these systems may be considered as a way to better preserve the valley's valuable natural and cultural resources.

XXXVI

EVALUATION SUMMARY CHART

MARIPOSA GROVE ACCESS ALTERNATIVES

	Goat Meadow Shuttle Staging Area	**Wawona Shuttle Staging Area**	**Grizzly Giant Parking Area**
Visitor Transportation and Management	◦ Increases overall visitor length of stay ◦ Average visitor delay = 24 minutes ◦ Distributes grove visitation equally over time ◦ Concentrates visitors into groups ◦ Reduces vehicular circulation and congestion at south entrance intersection ◦ May require independent Wawona Campground/Hotel shuttle	◦ Greatest Increase in overall visitor length of stay ◦ Average visitor delay = 36 minutes ◦ Distributes grove visitation equally over time ◦ Concentrates visitors into groups ◦ Reduces vehicular circulation and congestion at south entrance intersection ◦ Intensifies activity in busy Wawona area ◦ Long back-tracking for some trips	◦ Most direct visitor access to Grove ◦ Average visitor delay = 0 Minutes ◦ Less control over visitor arrival times at grove ◦ Smaller visitor groups ◦ Requires traffic management at south entrance intersection ◦ May require independent Wawona Campground/Hotel shuttle
Visitor Experience	◦ Less convenient access to grove ◦ Increases perception of crowding in grove ◦ Increases shuttle-related noise in grove ◦ Reduces crowding in Wawona area	◦ Less convenient access to grove ◦ Increases perception of crowding in grove ◦ Increases shuttle-related noise in grove and on route to Wawona	◦ Most convenient visitor access to grove ◦ Reduces crowding in Wawona area
Resource Impact	◦ Space requirements for parking and visitor facilities = 3.3 acres ◦ Increases auto VMT by 620 miles per day ◦ Bus VMT = 1,133 miles per day ◦ Particulate and NO_x emissions would increase ◦ Restores natural habit and decreases soil erosion in lower grove ◦ Soil erosion and habitat disturbance on U.S. Forest Service land ◦ Maintenance facility requires 10,700 square feet (s.f.)	◦ Space requirements for parking and visitor facilities = 4.0 acres ◦ Reduces auto VMT by 3,498 miles per day ◦ Bus VMT = 1,805 miles per day ◦ Particulate and NO_x emissions could increase ◦ Restores natural habit and decreases soil erosion in lower grove ◦ Soil erosion and habitat disturbance on NPS land ◦ Potential staging area sites have meadow, meadow edge or wild and scenic river impacts ◦ Maintenance facility requires 11,671 square feet (s.f.)	◦ Space requirements for parking and visitor facilities = 2.5 acres ◦ Bus VMT = 381 per day ◦ New development in archeological district ◦ Minimizes development in lower grove ◦ Restores the most natural habitat and decreases soil erosion in lower grove ◦ Requires .75 mile of new road and stream crossing ◦ Staging area located on previously undisturbed land ◦ New maintenance facility not required.
Consistency With Park Service and Regional Planning Goals	◦ Relocates activity development outside park boundary	◦ Potential traffic, activity and noise impacts to private inholdings ◦ Intensifies activity in Wawona development area	◦ Previously recommended in draft development concept plan
Cost and Cost Effectiveness	◦ Higher cost than Grizzly Giant for parking construction, bus fleet and bus operating cost	◦ Most costly for parking construction, bus fleet and bus operating cost.	◦ Least costly ◦ Operating costs of shuttle could be covered by hotel surcharge
Implementation	◦ Requires coordination with U.S. Forest Service ◦ Requires relocation of south entrance station ◦ Creates new area for law enforcement and resource protection ◦ May require less extensive environmental documentation ◦ Number of transportation employees = 21	◦ Relocation of south entrance station recommended ◦ Requires environmental documentation ◦ Number of transportation employees = 25	◦ Relocation of south entrance station recommended ◦ Requires completion of environmental documentation ◦ Number of transportation employees = 7

EVALUATION SUMMARY CHART

TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVES

	Designated Staging Area and Mandatory VTS Shuttle Services	**Designated Staging Area and Voluntary VTS Shuttle Services**
Visitor Transportation and Management	• Consolidates and simplifies day use visitor parking • Improves access to shuttle by providing designated parking area • Eliminates direct private vehicle access to visitor activity areas • Increases travel distance for visitors from west • Organizes visitor distribution • Reduces pedestrian/traffic conflicts • Reduces traffic circulation	• Improves access to shuttle by providing designated parking area • Maintains limited direct private vehicle access to visitor activity areas • May encourage circulation to find parking spaces • Visitor and vehicle activity more dispersed
Visitor Experience	• Simplifies parking and access to shuttle system • Reduces visitor confusion and uncertainty • Eliminates visual disruption of parked vehicles in road corridor • Increases access time and walking distances to some locations • Requires transfer of recreational equipement to shuttle for all users	• May be more convenient for some visitors • Provides backup parking to primary access points • Requires transfer of recreational equipment to shuttle for some users • Eliminates some visual disruption of parked vehicles in road corridor • May increase access time and walking distances to some locations
Resource Impact	• Space requirements for parking and visitor facilities = 7.5 acres • Eliminates habitat, soil erosion, and water quality impacts by removing road edge and trailhead parking • Removes parking from wild and scenic river corridor • Maintenance facility requires 19,770 square feet (s.f.)	• Space requirements for parking and visitor facilities = 5.1 acres • Reduces habitat, soil erosion, and water quality impacts by removing road edge and informal trailhead parking • Reduces parking in wild and scenic river corridor • Maintenance facility requires 15,088 square feet (s.f.)
Consistency With Park Service and Regional Planning Goals	• Development concept plan planned for area • Reduces wild and scenic river impact	• Development concept plan planned for area • Some reduction in wild and scenic river impacts • Lower cost
Cost and Cost Effectiveness	• Most costly option	• Less costly alternative
Implementation	• Simplifies parking and traffic enforcement • Number of transportation employees = 49 • Easiest management of visitor limits	• Multiple areas to enforce parking restrictions • Difficult to contain parking in designated activity lots • Number of transportation employees = 39 • Requires promotion to encourage visitor use • improved management of visitor limits

EVALUATION SUMMARY CHART

YOSEMITE VALLEY VTS ALTERNATIVES

	Bus Transit	**Light Rail Transit**	**Elevated People Mover Transit**
Visitor Transportation and Management	• Reduces private vehicle/ VTS conflicts • Maximum route flexibility • Some potential for VTS delays from visitor traffic • Connector wait time = 1.0 minute (standard bus) to 1.5 minutes (articulated bus) • Circulator wait time = 2.0 minutes (standard bus) to 3.0 minutes (articulated bus) • Travel time, Camp 6 - Taft Toe = 10.1 minutes	• Major reduction in private vehicle/VTS conflicts • Inflexible alignment • Minor potential for VTS delays at visitor traffic crossings • Connector wait time = 2.5 minutes • Circulator wait time = 3.75 minutes • Travel time, Camp 6 to Taft Toe = 10.1 minutes	• Eliminates private vehicle/VTS conflicts • Requires vertical circulation of passengers • Inflexible alignment and stations • No delays from visitor traffic • Connector wait time = 3.0 minutes • Circulator wait time = 5.0 minutes • Travel time, Camp 6 to Taft Toe = 9.3 minutes
Visitor Experience	• May increase VTS related noise • Visual impact limited to vehicle presence • Maintains close contact with immediate environment • Frequent vehicle passage along VTS route	• System may have novelty appeal to visitors • Reduces VTS-related noise • Overhead power wires may disrupt views from valley floor • Maintains close contact with immediate environment • Noise impacts during construction • Visitor access disrupted during construction	• System has strong novelty value • Reduces VTS related noise • Trip time lengthened by station access • Elevated guideway structure will disrupt views from valley floor and Glacier Point • Character may conflict with natural environment • Provides unique viewpoints from elevated guideway • Reduces contact with immediate environment • More difficult to transport recreation equipment • Noise impacts during construction • Visitor access disrupted during construction
Resource Impact	• Conventional bus maintenance facility requirements = 35,146 s.f. (could be located outside Valley) • Articulated bus maintenance Facility space requires 30,822 s.f. (could be located outside Valley) • Eliminates VTS traffic from 2.5 miles of road • Increases VTS/wildlife conflicts • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	• Eliminates VTS emissions • Maintenance facility space requires 44,480 s.f. (must be located in Valley) • Eliminates VTS traffic from 2.5 miles of road • Reduces VTS/wildlife conflicts • Eliminates VTS impact on water quality • May require new river crossing at Sentinel Bridge • May increase transportation corridor width required • Extensive construction in archeological district • Habitat disruption during construction • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	• Eliminates VTS emissions • Maintenance facility requires 35,430 s.f. (must be located in valley) • Eliminates VTS traffic from all roads • Eliminates VTS/wildlife conflicts • Eliminates VTS impact on water quality • Habitat disruptions at pier locations • Extensive construction in archeological district • Habitat disruption during construction • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)
Consistency With Park Service and Regional Planning Goals	• Reduces vehicle influence in Valley	• Major reduction in vehicle influence within valley • Requires new construction within designated wild and scenic river corridor	• Major reduction in vehicle influence within valley • Requires new construction within designated wild and scenic river corridor
Cost and Cost Effectiveness	• May require additional road repair • Lowest capital cost • Highest operating cost	• Very high capital cost • Lower operating cost than standard bus	• Highest capital cost • Lowest operating cost
Implementation	• Number of transportation employees = 92 (conventional bus) • Number of transportation employees = 66 (articulated bus) • Turnkey implementation possible with existing concessioner • System implementation may not require environmental documentation	• Number of transportation employees = 47 • Requires some special skills for advanced technology • Requires specialized construction expertise • System implementation would require environmental documentation • Construction crew housing required • Requires existing electrical service to be upgraded	• Number of transportation employees = 36 • Requires highly specialized skills for advanced technology • Requires specialized construction expertise • System implementation would require environmental documentation • Construction crew housing required • Requires existing electrical service to be upgraded

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PROBLEM STATEMENT

Transportation within Yosemite National Park has been the subject of controversy almost from the park's inception. Just seven years after the first automobile made its way into Yosemite Valley along the Old Wawona Road in 1900, the officer in charge of the federal cavalry troops assigned to the administration of Yosemite banned all automobile traffic from the park. Despite the efforts of automobile lobbyists, the ban remained in effect until 1913. In that year, British ambassador James Brice said, ". . . if you were to realize what the result of the automobile will be in that wonderful, incomparable valley, you will keep it out."

Despite this advice, the Secretary of the Interior, Franklin K. Lane, in reopening the park to automobile access, announced, ". . . I want to make our parks as accessible as possible to the great mass of people." A great mass of people did come to the park - 2.5 million in 1981, 3.4 million in 1991, and over 3.8 million in 1992.

With increased visitation came the need to expand facilities, including provisions for an increasing number of private vehicles and a rapidly growing number of tour buses. Increasing congestion and the constant need for more space for the movement and storage of hundreds of private vehicles threatened the park's resources and special qualities. In 1980, the *Yosemite General Management Plan* stated:

> Increasing automobile traffic is the single greatest threat to enjoyment of the natural and scenic qualities of Yosemite. . . . The ultimate goal of the National Park Service is to remove all private vehicles from Yosemite Valley. The Valley must be freed from the noise, the smell, the glare and the environmental degradation caused by thousands of vehicles.

In 67 years, transportation policy at Yosemite had come full circle.

PROGRESS TO REDUCE VEHICLE IMPACTS

Over the last 12 years, at least six different strategies for removing some or all private vehicle traffic from Yosemite Valley have been suggested, including the concepts presented in the general management plan. None of these approaches have been implemented or tested; however, progress has been made to reduce crowding in the valley. Approximately 600 parking spaces have been removed, a new concession services plan calls for reduced overnight accommodations in the valley, and a traffic management plan has been developed to prevent vehicles from entering the east valley during the most congested hours on peak summer days. The Park Service has improved service on the valley shuttle system, which carries up to 26,000 passengers per day. Despite these steps, the automobile is still a pervasive influence on the visitor experience and on the environment of Yosemite Valley.

Meanwhile, visitation levels have increased in other parts of the park as visitors seek quieter and more private settings in which to enjoy nature. Overcrowding of parking facilities and spot traffic congestion problems now occur on a daily basis at Mariposa Grove, Wawona, and Tuolumne Meadows. These conditions lead to visitor frustration, confusion, and delay. The relative calm that these places used to offer visitors has been replaced by a visitor experience which is increasingly urban in character. Visitor shuttles have been implemented in each of these areas to reduce the need for auto travel, but they suffer from a lack of convenient access points with a reliable parking supply. Visitation to Glacier Point has also increased substantially; however, the capacity of the newly-improved parking area and the roadway leading to it appear to be in relative balance with the comfortable visitor capacity of the viewpoints. As a result, this study did not consider VTS options to serve Glacier Point.

PARKWIDE CONDITIONS

On an average summer day in 1992, 6,500 to 7,000 vehicles entered Yosemite. Some of these trips could have been eliminated with improved visitor information and orientation systems. At present, only the Big Oak Flat entrance station provides park orientation, information, and registration for campgrounds. No information is provided on the status of lodging facilities until visitors reach their destination in the park. Due to increasing parkwide visitation, most of Yosemite's overnight accommodations are reserved months in advance. No-shows free up a proportion of the accommodations and many visitors, hopeful of securing a place to stay in the valley or elsewhere in the park, travel to the park to try their luck. Extra traffic is generated by visitors seeking overnight accommodations when none are available. Advance information, either at the entrances or in gateway communities, is needed to allow visitors to more effectively plan their stay in and travel through the park. If day use reservations are implemented, the need for advance information will be greatly increased.

Yosemite National Park is located in the Mountain Counties Air Basin as delineated by the California Air Resources Board. As designated by the Clean Air Act, the air quality in Yosemite National Park is classified as Class 1, indicating the lowest allowable increments of degradation. Air pollutants in the park originate primarily from populated areas outside the park. Vehicular emissions from traffic on park roads and in visitor use areas incrementally degrade air quality-contributing nitrous oxides, hydrocarbons, carbon monoxide, and particulate matter. Campfires also add small amounts of pollutants that slightly, but temporarily, decrease local air quality. Serious impairment to visibility occurs on 90% of summer days from external and internal human sources. Visible ozone injury has been found on 29% of the ponderosa and Jeffrey pine surveyed in the park. Measures to reduce vehicle travel will contribute to maintaining the park's air quality, but parkwide visitor travel makes little contribution to the area's existing air quality problems.

Despite the recent growth in visitation to Yosemite, the negative impacts of vehicle travel have been mostly limited to the primary activity centers of Tuolumne Meadows, the Mariposa/Wawona Grove area, and the valley. Traffic backups occur at entrance stations, due to the lack of staff and the need for more entrance lanes. Once in the park, visitors can enjoy a pleasant drive through varied surroundings, with the opportunity to make informal stops at uncrowded viewpoints as their interests and desires dictate. This study concludes that the greatest need for expanded VTS operations in Yosemite is to provide access to and circulation within the three primary activity areas. Full access to the remainder of the park road system is vital to continued visitor enjoyment, and only marginal environmental or resource preservation benefits would result from restricting private vehicle travel throughout the park. As a result, this study concentrates on visitor transportation and management in the three primary activity areas.

VISITATION LEVELS

The general management plan provides clear direction regarding the visitor volumes to be served by parkwide and activity area transportation systems. Monthly visitation reached 600,000 during August of 1991 and 1992. July visitation increased to 568,000 in 1992. Considering traffic volume counts and parking lot occupancies, the visitation on peak use days in the summer is now at the levels specified in the general management plan. It is likely that future annual growth in visitation will occur though increased activity on off-peak days and in the less congested spring and fall months. This trend would improve the cost-effectiveness of investments that must accommodate the peak demand levels defined in the general management plan. The specific visitation levels to be accommodated in each of the three activity areas are shown in table 1.

One of the challenges faced by Yosemite park management is how to manage visitor use to achieve the specified visitor limits in the park's major activity areas. At present, facilities are not provided to allow efficient management of visitor use and travel in the park.

Table 1: Visitation Levels at Yosemite Activity Areas

Activity Area	Day Use Visitors[a]	Lodging Units[b]	Camping Units[a]	Overnight Visitors[a]	Total Visitors
Valley	10,530	1,215	756	7,711	18,241
Mariposa Grove	3,850	0	0	0	3,850
Tuolumne Meadows/Tioga Road	2,745	122[c]	322	2,048	4,793

Source: General Management Plan, Concession Services Plan, Yosemite National Park.

[a] General Management Plan

[b] Concession Services Plan

[c] Includes High Sierra Camps

Monitoring of visitation levels is difficult due to dispersed parking locations, expansion of informal roadside parking and an absence of real-time information for motorists. Reservation systems are in place for overnight visitors, but day users gain access to all areas of the park on a first-come, first-served basis.

VISITOR USE PATTERNS

Day use visitation grew from 15% of all visitors in 1981 to 37% in 1991, an August 1993 survey of visitors leaving the park indicated that 56% of the visitor parties had entered Yosemite on the same day. Of the park's day users, about 40% spend at least one night in campgrounds or lodging near the park. Overall, 25% spend less than one day in Yosemite and the surrounding region. Many of these day users are residents of the central valley cities of California who visit Yosemite as part of a day trip. Steady increases in the number of visitors entering the park from the south reflect growth in this aspect of park use.

Tour bus travel to Yosemite is increasingly popular. Over 13,000 buses entered the park in 1992. That number represents over 10,000 more buses than were counted in 1983. More than 15% of all users are now estimated to reach the park by bus. Some of the park roads and all of the activity areas are unable to efficiently accommodate bus access and parking. While access by bus is more efficient than private vehicular travel, without facilities of adequate size to handle existing volumes of bus travel, the park is negatively affected by tour bus use.

Visitor surveys show that more than 60% of summer visitors to Yosemite are making a larger trip which includes other destinations. Over 80% of bus trips to the park are also part of a larger itinerary. Many of these travelers to the park which are part of a more extensive trip enter at one gate and exit at another. A 1993 survey recorded that 57% of visitor trips to Yosemite enter and leave the park at different locations.

A total of 70% of visitors entering the park by car and 100% of those coming by bus go to Yosemite Valley. It was determined from the survey that 63% of all Yosemite visitors travel to two or more of the major activity areas of Yosemite Valley, Tuolumne Meadows, Glacier Point, and Mariposa Grove.

ACTIVITY AREA CONDITIONS

Mariposa Grove and Wawona

Mariposa Grove is served by a small parking area located within the lower grove. Parking demand exceeds the supply on nearly every summer day, causing the grove access road to be closed to visitor traffic in the late mornings and early afternoons. Visitors are directed to overflow parking areas located adjacent to the south entrance and seven miles to the north in Wawona. A shuttle bus service is provided between the parking areas and the grove. The use of the overflow parking area in Wawona and ridership on the shuttle bus system have grown tremendously. Parking activity in Wawona conflicts with visitor access to the store. Demand has grown to the point that strip parking along the roadway is used, along with the formal parking areas near the store.

Traffic conflicts at the south entrance roadway have multiplied with the growth in visitation to the grove. The location of the entrance station, parking for a restroom facility, a small overflow parking lot, and the control point for the grove access road, all within a short distance of the heavily travelled three-way intersection, create a nearly impossible traffic management situation. Conditions are worst when the grove access is closed and vehicles must turn back into the intersection they just travelled through. Traffic safety problems arise when the two entrance lanes, which feed directly into the intersection, are open. Northbound vehicles using the right lane cross the path of vehicles bound for the grove from the left lane. Visitor confusion is an increasing problem due to the traffic conflicts and the varying means of access to the grove, depending on the closure status of the parking lot and access road.

The Wawona shuttle system has been effective in serving the demand for access to the grove from overflow parking areas, but the service can be irregular, causing delays and uncertainty for passengers. A schedule that is achievable, considering travel times and the potential for delays, should be developed and followed. A regular schedule would help to distribute demand over time and could reduce the number of buses needed to carry the current demand.

Traffic conflicts are common at the south entrance.

The long-term intent of the general management plan was to preserve and enhance the wilderness essence of the park. This would be accomplished at Mariposa Grove by removing the existing parking area and achieving five broad goals[2]:

- Reclaim priceless natural beauty. Parking, tram staging, gift shop, refreshments, and warehouse facilities would be removed from the lower Mariposa Grove, and support facilities that relate directly to the enjoyment of the park would be relocated to nearby, more resilient environments. This would allow the heavily impacted giant sequoia grove to be restored to a more natural condition.

- Markedly reduce traffic congestion. Increased use of pedestrian and tram access to the grove would be encouraged from outlying parking and staging areas.

- Allow natural processes to prevail. Removal of parking and structures in the lower Mariposa Grove and restoring the site would allow natural processes to prosper.

- Reduce crowding. Removal of parking from the grove would significantly reduce crowding and congestion in the area, which would allow visitors greater opportunity to view and enjoy the resource experience.
- Promote visitor understanding and enjoyment. The interpretive program at the grove would be improved to provide information on the importance, significance, and ecology of the area.

The development of new parking facilities at one of several potential sites in early planning stages offers the opportunity to effectively manage visitor use, reduce the traffic conflicts associated with the grove access road, and remove the spill-over parking impacts from the store lot and roadside in Wawona. Improvements to the south entrance station to resolve the current traffic conflicts and visitor confusion should be evaluated as part of the project to address grove access and parking.

Tuolumne Meadows

Tuolumne Meadows has traffic conflicts due to a shortage of parking within the meadows and at the various trailheads scattered along Tioga Road to the west. Vehicles circulate as visitors search for parking places, and parking is spilling out of formal areas and onto the shoulders of Tioga Road. Pedestrians cross at random locations and parking maneuvers disrupt the flow of through traffic.

The Tuolumne shuttle, originally implemented in 1991, offers convenient service to overnight visitors who can secure a parking space. However, day use visitors to the area have as much trouble finding a parking spot near a shuttle stop as a spot near the activity area they wish to visit.

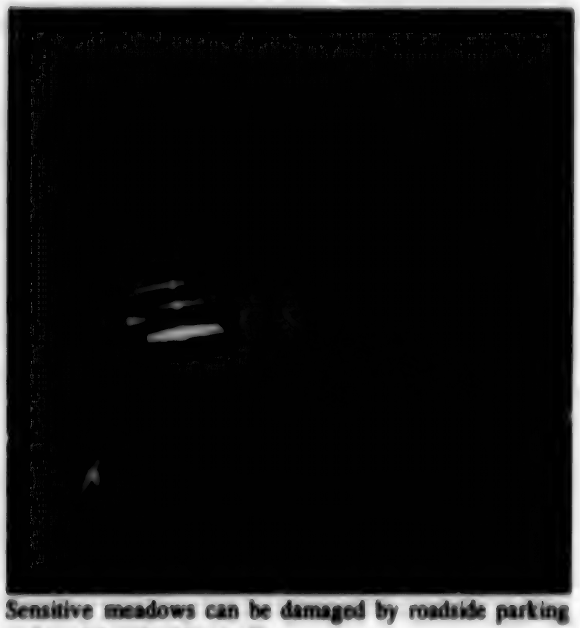
The Tuolumne River and Meadows is one of the most significant subalpine non-forest, wetland habitats in Yosemite. The meadows have been determined eligible for listing on the National Register of Historic Places; the river through the meadows is designated scenic under the Wild and Scenic River Act.

Significant habitat and wetland disturbance and soil compaction is occurring in the meadows because of dispersed visitor facilities, a lack of interpretive information about the sensitivity of the area, and the insufficient parking supply. Widespread informal, pull-off roadside parking, and a proliferation of social pedestrian trails that crisscross fragile meadows and riparian areas to the river, have resulted from the current parking shortage. Pull off parking also destroys natural roadside vegetation and increases soil erosion from roadway runoff. Tuolumne Meadow is more sensitive than meadows at lower elevations because the shorter growing season makes natural and assisted revegetation of disturbed areas more difficult. In addition, the impacts to the river edge environment caused by the random social trail access are inconsistent with its scenic designation.

The facilities at Tuolumne Meadows are dispersed in a fragmented pattern of development. As a result, there is no real coherent and identifiable character of development. Older, architecturally significant buildings are mixed with temporary-appearing structures and with featureless recent permanent structures. There is no landmark central element for orientation or sense of arrival. Pedestrian circulation among facilities is difficult, interrupted periodically by the numerous parking areas. Overall, the facilities do not provide a strong, identifiable sense of place or organization from which it would be possible to direct or control use of this most critical resource. Random roadside parking contributes to the inconsistent, scattered development of the area.

Yosemite Valley

An average of 5,600 cars enter Yosemite Valley on summer days. Traffic volumes have reached 1,100 per hour during holiday weekends, exceeding the capacity of the valley loop roadway system. Congestion is a recurring problem at the village intersection and the

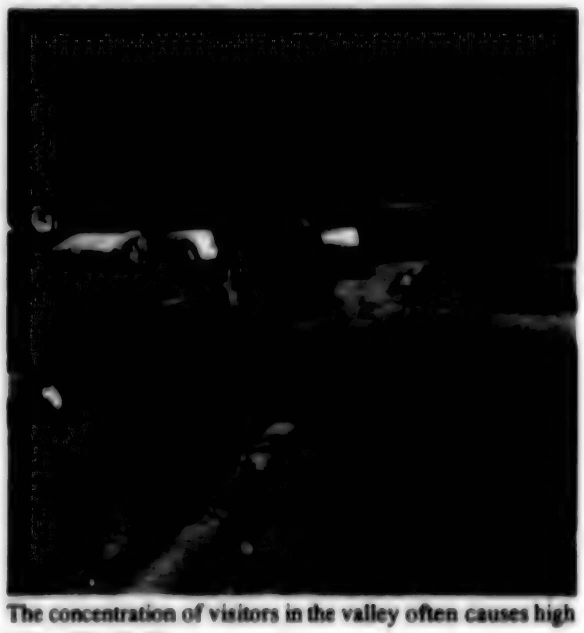


Sensitive meadows can be damaged by roadside parking and social pedestrian trails.

Yosemite Falls intersection of the Northside Drive. A traffic management strategy which diverts vehicles bound for the valley at El Capitan crossover is implemented on three to four days during the summer. Unfortunately, with the current arrangement it is not practical to sort day use traffic from the vehicles carrying visitors with overnight reservations in the valley. Vehicle miles travelled for overnight visitors increase as they circulate through the west end of the valley waiting for access to be reopened.

When the reductions in overnight accommodations called for in the concession services plan and general management plan are implemented, approximately 4,000 daily vehicle trips will be made into the valley by visitors going to lodging units, campsites, and day use activities and an equal number of outbound trips will be made. Day use traffic will account for over 75% of these vehicle trips. Reduction or elimination of the day use trips has the potential to eliminate most of the negative impacts associated with private vehicles in the valley.

Because it is the focal point of most park visits, the urbanization of Yosemite Valley is particularly intense. The valley contains four separate development centers: Yosemite Lodge, Yosemite Village, Ahwahnee Hotel, and Curry Village. Each year 2.5 million visitors and nearly 1 million cars, trucks and buses crowd into the valley. Thirty miles of roadway bisect the valley floor, providing access to a scattered array of approximately 1,000 stores, restaurants, hotels, residences, and service buildings -- many nonessential to the operation of the park.



The concentration of visitors in the valley often causes high congestion levels.

Directly associated with the structures are individual parking areas of varying sizes, that create dispersed and fragmented patterns of development similar to strip commercial areas found throughout many towns and cities. This pattern of development significantly impairs the anticipated natural experience of park visitors, and compromises sensitive natural environments unsuited for this type and intensity of use.

Other examples of spreading urbanism in the valley include an abundance of regulatory and informational signage, incompatible architectural styles, traffic congestion on major roads, crowding at major attractions, loss of natural environment, a proliferation of social trails, and increasing conflicts among pedestrians, bicyclists, and vehicles.

Impacts to the quality of surface waters in the valley occur from vehicular use (releasing hydrocarbons via runoff or spills), camping sanitation, increased visitor use of the rivers for rafting and swimming, the destruction of vegetation and compaction of soils from the social use of sensitive areas for pedestrian and vehicular trails, pulloff roadside parking and other informal activities in meadows adjacent to surface waters. In spite of this, water quality within Yosemite is generally above state and federal standards.

Disruption of wildlife habitat and access to surface waters in the valley have occurred due to the destruction of natural meadows and wetlands from construction or informal use by park visitors. Familiar wildlife food, shelter and hunting perches have been removed, resulting in habitat fragmentation and the unnatural isolation of wildlife populations. This has a deleterious effect on genetic diversity and viability. In addition, increased vehicular traffic and informal road side parking cuts off wildlife access to surface waters and increases the potential for animal/vehicle conflicts — particularly during spring and fall migrations. In the valley, the Merced River is effectively cut off on both sides by high volumes of vehicular traffic, parking areas, and buildings.

ACCOMMODATING VISITOR USE

Yosemite affords a wide variety of recreation opportunities to visitors over a 1,200 square mile area. The solutions to specific transportation issues in the activity areas of the park should not materially affect the ability of visitors to enjoy the remainder of Yosemite's resources. By maintaining easy access and a high degree of personal freedom for visitors to uncongested areas, more diverse experiences and less crowding of visitors can be encouraged. Maintaining the current diversity of visitor experience is paramount among the essential requirements for effective transportation solutions in Yosemite as listed below:

- accommodate GMP visitation levels in all areas
- allow visitation to be managed to achieve GMP visitation levels
- afford a meaningful reduction in private vehicle travel
- allow current visitor use patterns to continue, including the ability to conveniently visit more than one area of the park in a one-day visit, allow trips through the park to be made by entering and exiting through different gates, and allow visitors to experience a full range of scenic and wilderness-oriented activities
- reduce vehicle-related emissions
- reduce energy consumption associated with transportation
- maintain visual quality in key areas, especially the pristine view across the west end of the valley from Discovery View and the view into the valley from Glacier Point
- employ proven, available technologies for visitor transportation systems
- be capable of operating in a safe manner in the Yosemite environment
- comply with the requirements of the Americans with Disabilities Act
- allow unrestricted movement of wildlife across and along the transportation system

The foremost requirement for transportation improvements in Yosemite is that the broader purposes of the park be considered. Solutions that eliminate vehicular traffic are not necessarily desirable if they disrupt existing views, cause environmental damage or inhibit visitor enjoyment of the park's natural beauty. A successful solution to Yosemite's transportation needs will balance the goal of reducing vehicle impacts with a range of other objectives, including the need to be cost-effective in making transportation investments.

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PARK OVERVIEW

REGIONAL CONTEXT

Yosemite National Park is located in the heart of the Sierra Nevada mountain range in east-central California. The park is about 180 miles directly east of San Francisco and 275 miles north of Los Angeles. Access to the park from the major population centers in California is provided by two primary western access routes and one southern route. Each of these routes connects with California Highway 99, a north-south freeway through the San Joaquin Valley. To the northwest, California Highway 120 enters Yosemite through Big Oak Flat. This route connects with California Highway 99 north of Modesto and is the most direct route to the park from Sacramento and San Francisco. California Highway 140 enters Yosemite at El Portal, providing access to California Highway 99 at Merced and passing through the gateway community of Mariposa. The southern route to Yosemite is California Highway 41, which connects the south entrance of the park near Fish Camp with the gateway community of Oakhurst and with California Highway 99 at Fresno, about 50 miles farther south. The southern route provides the most convenient access to Yosemite from Los Angeles.

A single access route is available to the park from the east. California Highway 120 crosses the crest of the Sierra Nevada range at Tioga Pass, connecting Yosemite with US 395 at Lee Vining. California Highway 120 provides an east-west route through the park during the summer. The Tioga Pass road is closed from Crane Flat to the east from November to April, limiting park access to the western and southern routes. The Vicinity map on the following page illustrates the park and the surrounding area.

PARK PURPOSE

The Miwok tribe existed at Yosemite for more than 2,000 years, and it is generally believed that the first Caucasians to see the Yosemite Valley were part of the Joseph Walker trans-Sierra expedition in 1833. During the 1850s Yosemite was visited by a host of writers, artists, and photographers, who publicized the beauty and increased the popularity of the area's spectacular setting of waterfalls, meadows, and towering formations of granite rock. By the 1860s commercial interests, including lumbering, mining, and ranching, were threatening the area's natural beauty and public access. Conservationists headed by Frederick Law Olmsted and I.W. Raymond appealed to Congress, and in 1864 President Lincoln signed into law a bill granting Yosemite Valley and the Mariposa Grove to the State of California ". . . for public use, resort, and recreation . . . inalienable for all time." Further work by conservationists, notably John Muir, resulted in an 1890 Act of Congress setting aside reserved forest lands comprised of 1,512 square miles of land surrounding the state land grants that would eventually become Yosemite National Park. In 1906, the State of California re-ceded Yosemite Valley and the Mariposa Grove of Big Trees to the federal government, finally bringing the entire park area under federal control. Like Yellowstone before it, Yosemite National Park was managed by the U.S. Cavalry until the founding of the National Park Service in 1916.

As stated in the general management plan, there are two purposes for the park:

> The first is the preservation of the resources that contribute to Yosemite's uniqueness and attractiveness — its exquisite natural beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments including the very special giant sequoia groves; the awesome domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic resources, especially those relating to the beginning of a national conservation ethic; and evidences of the Indians that lived on the land. The second purpose is to make the varied resources of Yosemite available to people for their enjoyment, education, recreation, now and in the future.

MAJOR RESOURCES

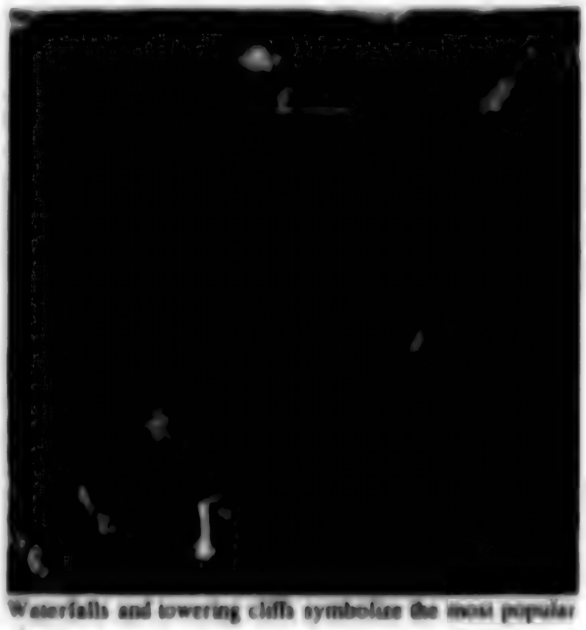
Designated a World Heritage Site in 1984, Yosemite is internationally recognized for its spectacular granite cliffs, waterfalls, clear streams, unique forest habitats, and biological diversity. The 1,200 square mile park contains 600 lakes, 1,300 miles of streams, 800 miles of hiking trails, 350 miles of roads, and 2,000 campsites. The map on page 11 provides an overview of the park.

The park ranges from 2,000 feet to more than 13,000 feet above sea level, offering visitors three major features - the alpine meadows and granite domes of the high Sierra, groves of giant Sequoias, and Yosemite Valley (the park's most popular attraction). The major park features and locations of concentrated visitor use are summarized below.

Yosemite Valley

The valley is the world's best known example of a glacier-carved canyon. The seven-mile long valley is characterized by sheer walls rising from 3,000 to nearly 5,000 feet above the flat valley floor. Several waterfalls plunge hundreds of feet from the valley rim into the clear-running Merced River which flows through the length of the valley. The waterfalls, towering cliffs, rounded domes, and massive monoliths make Yosemite a preeminent natural marvel, memorialized by the paintings and photographs of John Muir, Ansel Adams, and many others. Yosemite National Park and especially the valley, are significant in the history of the conservation ethic which led to the creation of the National Park Service. The most distinctive granite geologic formations include El Capitan with its 3,000 foot vertical wall, Half Dome with its unique shape, and Cathedral Rocks.

The valley is served by a network of roads, a shuttle bus system, several pedestrian and bike paths, and a full range of lodging and camping facilities, making it accessible to more than 2.5 million visitors each year. The park's major visitor services, including the visitor center, stores, and recreational concession services, are located in Yosemite Valley.



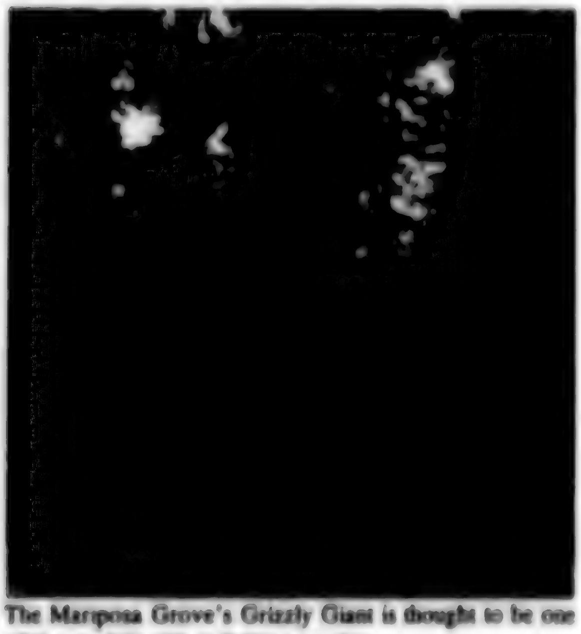
Waterfalls and towering cliffs symbolize the most popular views.

Giant Sequoia Groves

The largest giant sequoia grove in Yosemite is the Mariposa Grove, 35 miles south of Yosemite Valley. The Mariposa Grove's Grizzly Giant is 2,700 years old, one of the world's oldest living giant sequoias. Access to the Mariposa Grove is provided by a two-mile road from the south park entrance and a parking area, located at the south end of the grove. A shuttle bus system provides access to the grove from nearby Wawona during the peak visitor season. The park's concession operator provides open-air tram tours on a paved route through the grove, which is also served by walking trails. A small museum is located near the center of the grove. Two smaller giant sequoia groves, Tuolumne and Merced, are located near Crane Flat.

Glacier Point

Perhaps the most spectacular view of Yosemite Valley is from Glacier Point, where the major peaks, the 2,425 foot drop of Yosemite Falls, and the valley floor – 3,200 feet below – are all visible. Glacier Point is 32 miles from Yosemite Valley via Glacier Point Road over Badger Pass. The road is closed at Badger Pass Ski Area in winter. In winter, the Glacier Point Road beyond Badger Pass is a popular cross country ski route to Glacier Point. The Four-Mile Trail leads hikers from the valley floor to Glacier Point.



The Mariposa Grove's Grizzly Giant is thought to be one of the world's oldest living sequoias.

Tuolumne Meadows/Tioga Pass

Tuolumne Meadows, at 8,600 feet, is the largest subalpine meadow in the Sierras, and is known for its wildlife, wildflowers, and alpine scenery. It is 55 miles from Yosemite Valley via Tioga Road. The Tuolumne area is popular with backpackers, day hikers, and climbers. Several granite domes can be reached by trails leading from the Tioga Road. The Tuolumne Meadows area also has a large campground and a lodge, offering tent-cabin accommodations.

PARK ENVIRONMENT

Topography

Congress has set aside 677,000 acres of Yosemite, more than 94% of the park, as wilderness. The park ranges in altitude from 2,127 feet at the Arch Rock Entrance, to 4,000 feet in Yosemite Valley, to 13,114 feet at Mt. Lyell in the Cathedral Peaks on the east side of the park. The most dramatic elevation changes occur in Yosemite Valley where the relatively flat Valley floor is surrounded by cliffs and monoliths ranging over 8,000 feet in elevation.

The park is crossed by two major river systems, the Tuolumne and the Merced. From its source in the high Sierra, the Tuolumne River flows through Tuolumne Meadows and into the Grand Canyon of the Tuolumne. Near the northwestern boundary of the park, the river is dammed to form the Hetch Hetchy Reservoir, a major water collection and storage facility built for the city of San Francisco in 1923. From its headwaters to Hetch Hetchy Reservoir, the Tuolumne River is protected under the Wild and Scenic River Act. Its designation under the act is wild, except within portions of Tuolumne Meadows where the designation is scenic.

The Merced River flows from its headwaters at Mt. Lyell through Little Yosemite Valley and into Yosemite Valley. From its source to upper Yosemite Valley, the Merced is designated wild under the Wild and Scenic Rivers Act. In the upper valley, from Illilouette Creek to the Sentinel Picnic area, the river is designated recreational; in the lower portions of the valley to the park boundary, it is designated scenic.

Geology

Yosemite has a relatively young history of tremendous geologic forces resulting in steep topography, exfoliating granite rock surfaces, sheer canyon walls, eroding soils, and unstable glacial deposits in narrow river canyons. Glaciation was the primary force eroding and widening the valley bottoms and leaving behind the sheer granite cliffs, domes, and valley walls.

When the glaciers melted, the high Sierra was left dotted with lakes, marked with domes, and laced with clear-running mountain streams. Some of the lakes have filled with sediment and are now meadows or forested flats.

Resource education is an important park purpose, as stated in the general management plan.

Soils

Soils in the park are derived primarily from the underlying granite bedrock. The general management plan identifies limitations on use in some areas related to poorly drained soils, severe slopes, shallow soil depth, and associated fragile vegetation. Yosemite's soils in some localized areas have a low capacity to buffer groundwater affected by acid precipitation. The entire Sierra Nevada range is sensitive to acid precipitation due to its thin soils and granitic substrates. Some soils within the park are also affected by hazardous materials from past logging and mining activity, underground storage tanks, historic landfills, and previous improper disposal of human and livestock wastes. Park management has established corrective action and clean up as a high priority.

Climate

The climate on the valley floor at 4,000 feet is characterized by cool winters and hot, dry summers. Annual precipitation totals 36 inches, with 33% occurring in the winter as snow. High elevations in the park have more alpine weather conditions with cooler high and low temperatures, and greater precipitation (mountain thunderstorms in the summer and greater snow accumulations in winter). The south entrance receives 135 inches of snow as part of 45 inches of annual precipitation. Tioga Road and Glacier Point Road experience even higher snow accumulations and are closed in the winter. The dry summer climate results in conditions conducive to natural fires. Fire plays a significant role in the ecology of the region. Decades of fire suppression have altered natural vegetation in the park, leading to a denser forest canopy, more growth in the understory, accumulations of fuels on the forest floor, a shift toward shade tolerant trees, and a decline in shrubs and herbs.

Vegetation

The major vegetation zones of the park are chaparral (below 3,000 feet), mixed conifer (3,000 to 7,000 feet), red fir (6,500 to 8,500 feet), lodgepole pine/subalpine (8,000 to 10,500 feet), and alpine (above 10,000 feet). Meadows are considered to be a distinct vegetation zone, but can occur in all zones. Park roads traverse all but the alpine zone. Giant sequoias occur in isolated pockets in the mixed conifer zone. Other major vegetation communities include black oak woodland (Yosemite Valley), canyon live oak, lower mixed chaparral, blue/live oak woodland, meadow, and low elevation meadow.

Wildlife

The park hosts a wide variety wildlife. Prominent large mammal species include American black bear and mule deer. More rare are California big horn sheep, which are an endangered species with an estimated population of 60 animals. In all, there are more than 50 threatened, endangered, and sensitive animal species in Yosemite, including great grey owls and peregrine falcons. More numerous are California spotted owls, golden eagles, osprey, and northern goshawk.

Fish life in the park has been dramatically altered due to human influences, including streamside development, altering of the ecosystem, and the stocking of non-native fish. Non-native brown trout outnumber native rainbow trout four to one in the Merced River.

Cultural Resources

Yosemite's archeological resources include the remains of prehistoric villages, campsites, resource procurement areas, artifact caches, cemeteries, and sacred heritage sites of the Yosemite Miwok Indians. A total of 12 prehistoric archeological districts (including several hundred individual sites) are listed on or eligible for listing on the National Register of Historic Places. Historical resources include buildings, bridges, trails, roads, and sites associated with people and events in Yosemite's history. A total of 144 structures are on the List of Classified Structures, 24 historic structures are listed on the national register, and three others are eligible for listing. Three structures within the park are listed as national landmarks. hundreds of additional sites, features, and structures have yet to be evaluated for significance.

Visual Resources

Extensive portions of Yosemite have significant visual quality. Foreground views of specific plant species, animals, and water features are important. In addition, wide landscape views of large rock features, waterfalls and wilderness vistas are critical to the enjoyment of the park. Views have been affected by degraded air quality and by the introduction of manmade structures into the natural landscape.

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EXISTING CONDITIONS

This chapter documents existing conditions for Yosemite National Park as a whole and for three key areas identified as having special transportation problems:

- Mariposa Grove
- Tuolumne Meadows
- Yosemite Valley

The discussion of existing conditions includes visitation, visitor use patterns, visitor characteristics, visitor facilities, transportation facilities, transportation services, transportation conditions, environmental conditions, and resource impacts. Parkwide conditions are covered first, followed by sections discussing the most significant concerns in each the of the three key areas.

VISITATION

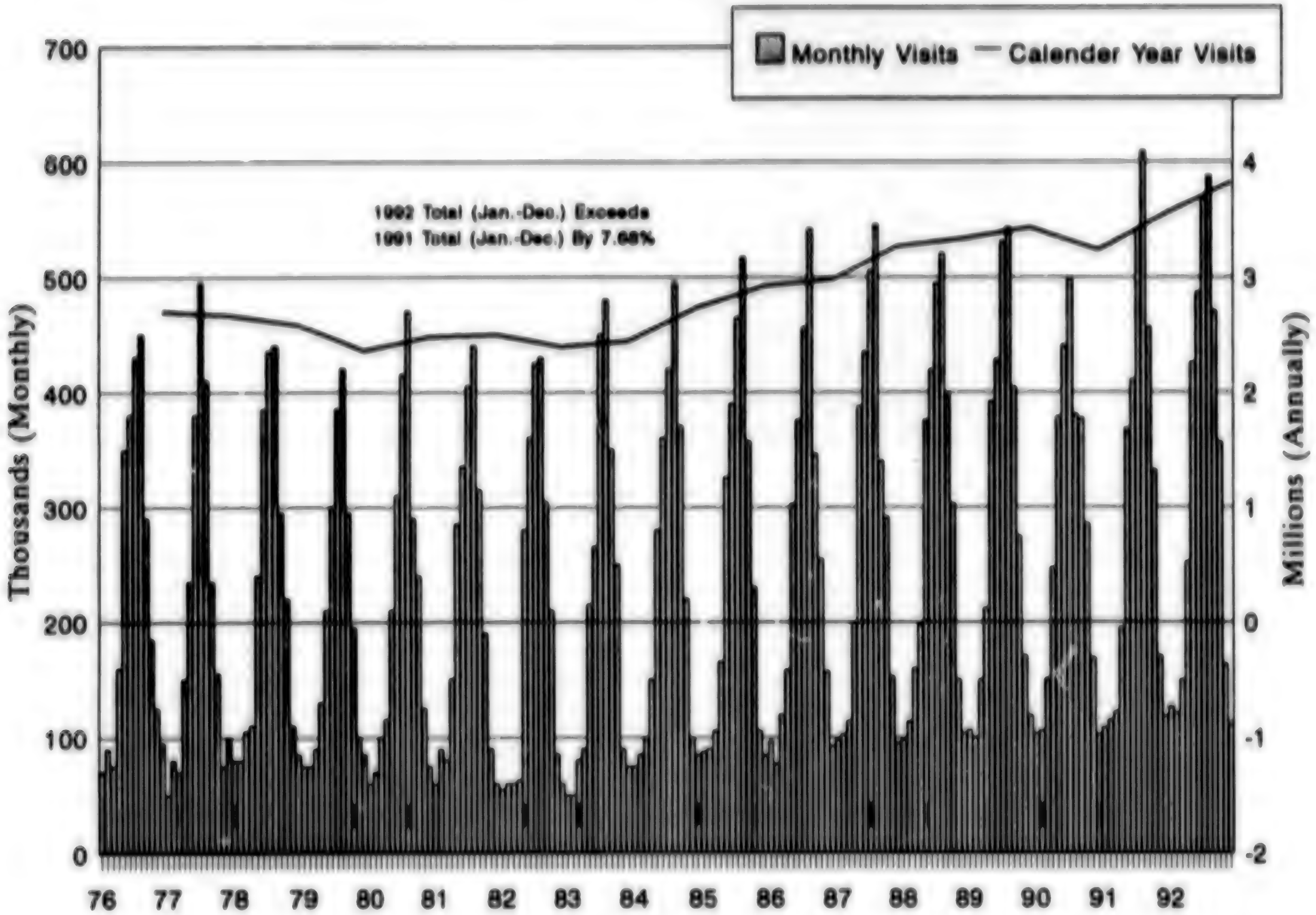
Visitation to Yosemite and Yosemite Valley has increased steadily over the last decade. In 1981, the number of recreation visitors to Yosemite was 2.5 million. Through the 1980s, visitation grew at a 3.1% annual rate to reach more than 3.4 million in 1991. A strong seasonal visitor pattern is evident at Yosemite, as shown in figure 1 - with low visitation in the winter, very high visitation in the peak months of July and August, and moderate visitation in the spring and fall shoulder months.

During the 1980s, August visitation to Yosemite reached a plateau of about 500,000 per month, indicating that the monthly visitation capacity of the park might have been reached. However, visitation totalled more than 600,000 in both August 1991 and August 1992. Total park visitation in July has also increased substantially in the last two years, reaching 568,000 in 1992. The months with the greatest visitation growth are June and September, which together experienced a 33% increase between 1985 and 1992. Yosemite National Park staff believe that 600,000 represents a practical maximum for monthly visitation to the park and that further annual visitation growth will occur by continued growth during the shoulder months. This trend is shown in a forecast of future Yosemite visitation prepared by the Wilderness Society, illustrated in figure 2.

Park visitation has grown substantially during July and August in the last two years.

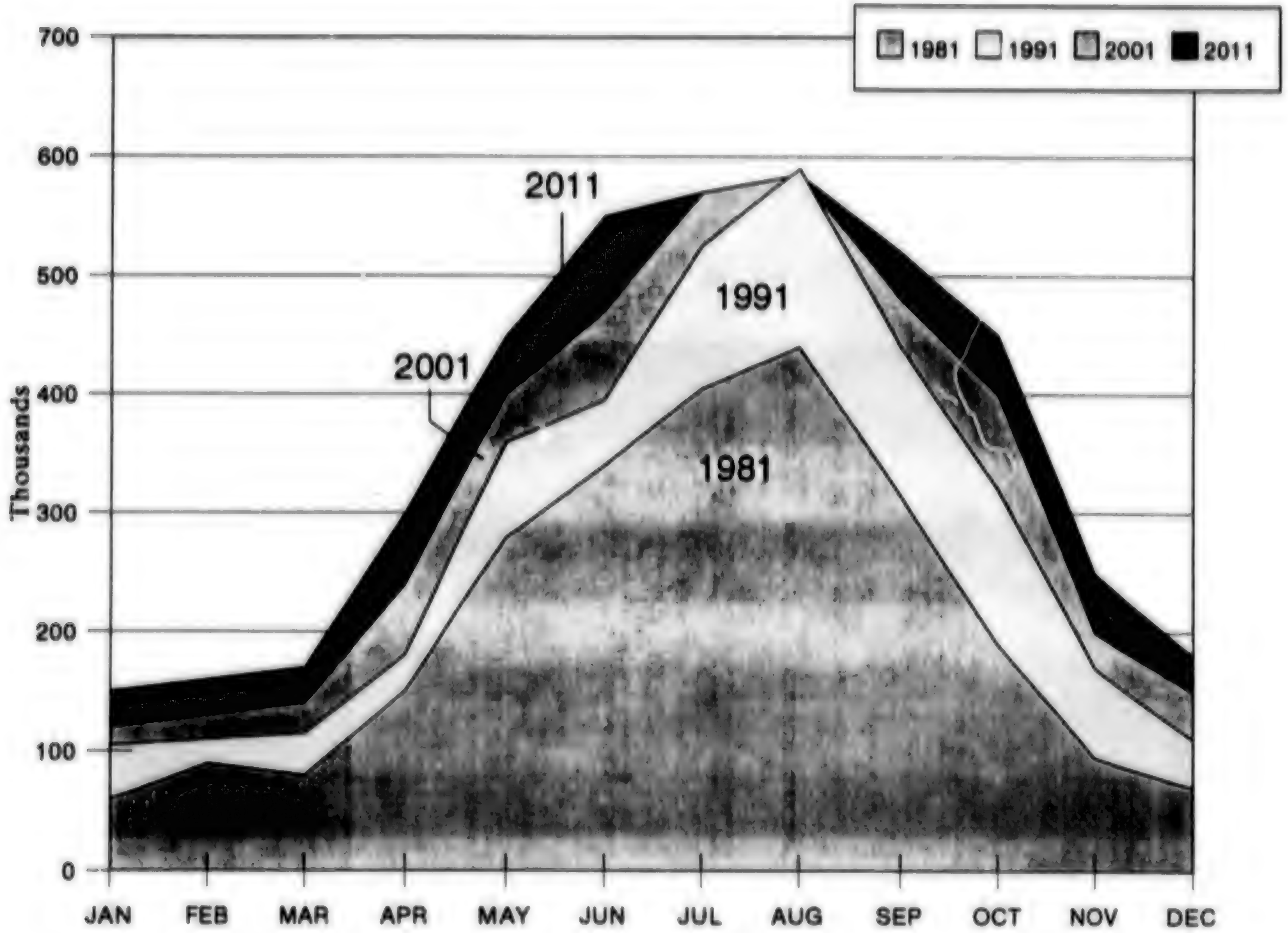
According to NPS visitor counts, 2.15 million, or 63%, of all visitors stayed overnight in the park in 1991, with concession lodging accounting for nearly half of the overnight total (see figure 3). Overnight visits have not increases in recent years. Day visitors account for nearly all increases in recorded recreation visits over the last decade, with an increase of more than 900,000 visits and an annual growth rate of 12.5%. Day recreational visits have increased from 15% percent of all visits in 1981 to 37% of all visits in 1991, as shown in table 2. The concession services plan and general management plan call for slight reductions in the supply of overnight lodging and camping accommodations. As a result, nearly all visitation growth in the future will result from day use visitor increases.

Figure 1: Yosemite National Park
Yosemite Monthly and Annual Visitation



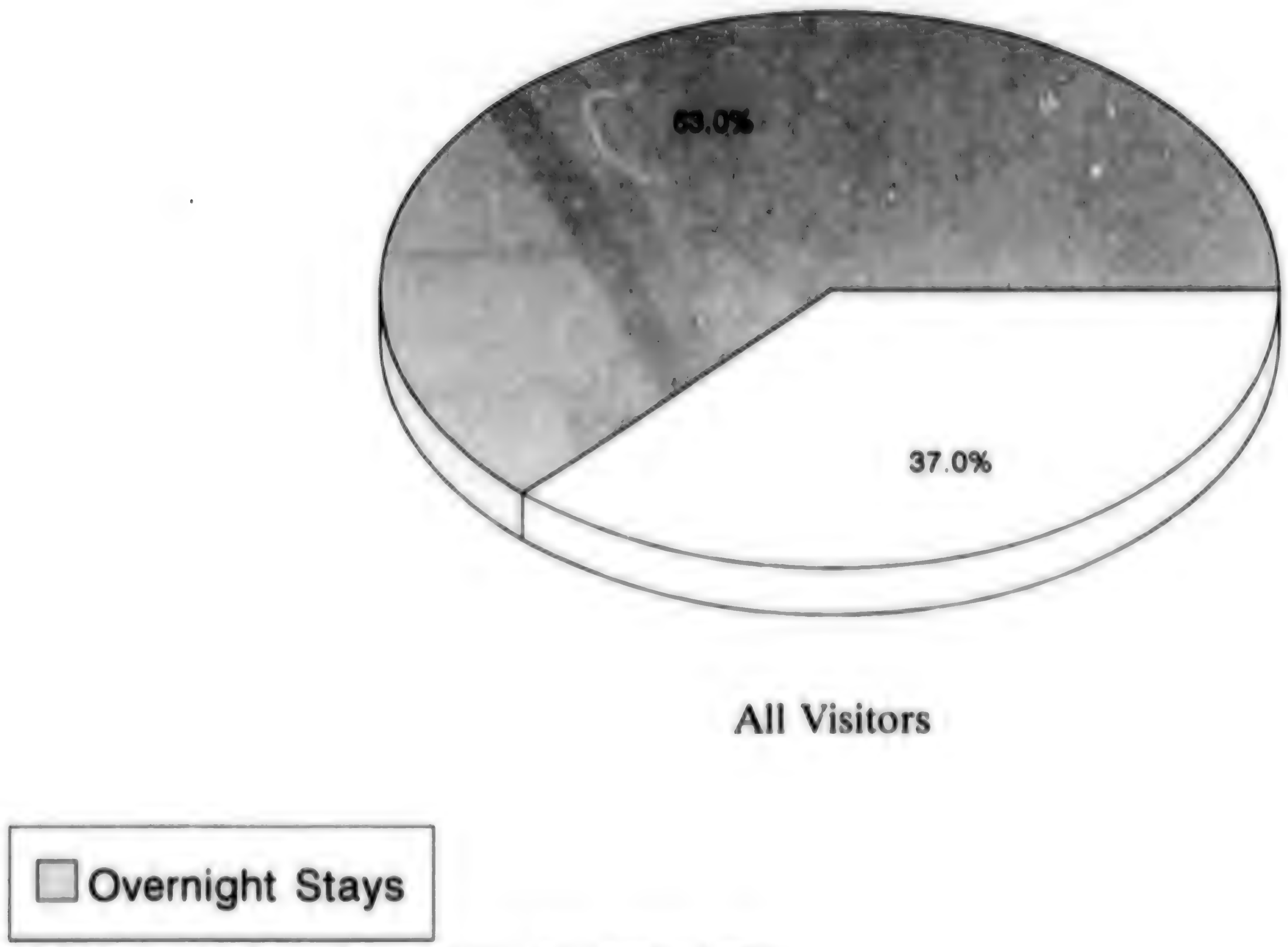
SOURCE: Yosemite staff, Yosemite Transportation Strategy
(Prepared By The Wilderness Society, 1992)

Figure 2: Yosemite National Park
Monthly Visitation Forecasts



SOURCE: Yosemite Transportation Strategy (Prepared By The Wilderness Society, 1992)

Figure 3: Yosemite National Park
Proportion of Visitors in 1991 Staying Overnight



SOURCE: National Park Service Denver Service Center Statistical Office

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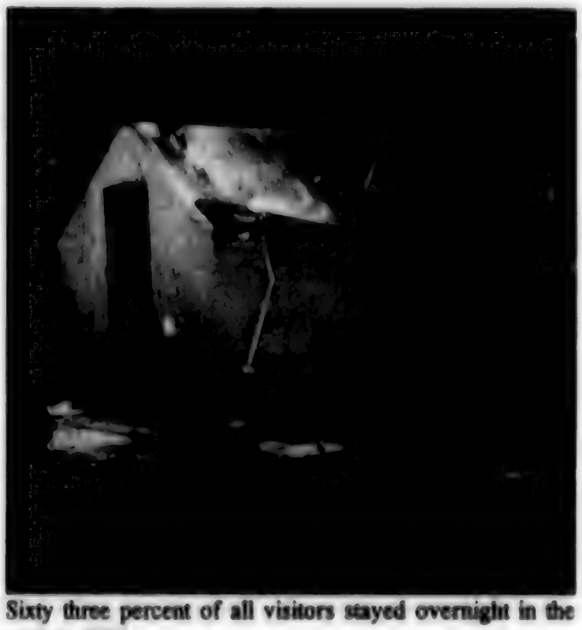
Table 2: Yosemite Recreational Visits

Year	Day Visits	Overnight Stays Tents	RVs	Backcountry	Hotel	Total Recreation Visits
1981	389,619	737,591	340,229	140,221	909,233	2,516,893
1982	387,312	665,191	339,074	125,557	907,453	2,415,587
1983	540,798	571,137	334,009	101,017	910,503	2,457,464
1984	527,552	747,145	407,930	111,788	944,052	2,738,467
1985	768,613	615,471	378,557	111,390	962,921	2,831,952
1986	993,116	511,981	284,479	105.614	981,527	2,876,717
1987	953,195	704,629	393,694	105,103	995,654	3,152,275
1988	930,903	717,811	437,244	102,601	1,028,113	3,216,681
1989	1,088,524	666,404	401,996	102,695	1,048,540	3,308,159
1990	904,519	754,555	333,886	102,133	1,029,846	3,124,939
1991	1,270,217	647,698	355,184	121,913	1,028,088	3,423,100
1981 - 1991 % Chg	+226.0 %	-12.2 %	+4.4 %	-13.1 %	+1.2 %	+36.0 %

Source: National Park Service, Denver Service Center Statistical Office



Sixty three percent of all visitors stayed overnight in the park in 1991.

Visitor surveys indicate that the proportion of summer visitors who stay overnight in the park is lower than the annual average.[3] During the peak season it is estimated that 58% of total visitors stay overnight in the park. The average length of stay in Yosemite for overnight visitors is 2.7 nights.

About 40% of summer visitors who do not stay overnight in Yosemite spend the night in nearby campgrounds or in the gateway communities surrounding the park.[4] As a result, about 75% of the park's summer visitors stay overnight at the park or in the immediate vicinity. Information is not available on the length of stay in areas surrounding the park, but it may be assumed that many visitors staying in gateway communities do so before arriving at or after leaving Yosemite as part of a more extensive vacation; thus, the average length of stay for those staying outside the park is probably somewhat shorter than 2.7 days.

The general management plan established maximum daily visitation levels for each of the activity areas in the park. Limits are defined for day use and for overnight visitation, as shown in table 3. These daily visitation limits have been used to define the peak requirements for the visitor transportation systems evaluated in this study.

Table 3: Visitor Use Levels for Developed Areas in Yosemite

Developed Area	Day Use Visitors	Overnight Visitors
Yosemite Valley District		
Yosemite Valley	10,530	7,711
Cascades/Arch Rock	360	0
El Portal	765	0
Wawona District		
Chinquapin	810	0
Badger Pass	3,300	0
Bridalveil C.G./Summit Meadow	360	490
Glacier Point	7,650	0
Wawona	1,689	1,622
South Entrance Station	4,525	0
Mariposa Grove	3,850	0
Mather District		
Tioga Pass	540	0
Tuolumne Meadows	1,485	2,048
White Wolf	45	675
Tenaya Lake Area	720	0
Crane Flat	900	800
Tioga Road Campgrounds	0	1,250
Hodgdon Meadow	540	800
Foresta	90	30
Hetch Hetchy	1,080	0
Mather Station	0	120
Merced Grove	405	0
High Sierra Camps	0	168

Source: Yosemite National Park, General Management Plan

On the busiest summer weekends, traffic counts and parking occupancy studies indicate that visitation at Yosemite has reached the prescribed limits, affording further evidence that future visitation increases will result from growth in off-peak attendance.

The prime resource areas with the highest day use summer visitation levels are Yosemite Valley, Glacier Point, Mariposa Grove, and Tuolumne Meadows. Overnight stays are concentrated in the valley, Wawona, Tuolumne Meadows, and at the campgrounds located along the system of park roads. The areas of day use concentration have recurring problems with traffic congestion, parking availability, and visitor crowding, which are the focus of this study. Badger Pass, with 3,300 visitors per day, is only active as a visitor destination during the ski season.

VISITOR USE PATTERNS

Three visitor categories have been identified for the analysis of visitor use and travel patterns: visitors staying overnight in the park, visitors staying overnight in areas near the park, and visitors staying in Yosemite and the surrounding area for the day only. The second and third categories are considered day use visitors from the park's perspective, but the travel patterns of those staying in area lodging and camping facilities is likely to be different from those who do not stay in the area.

A 1993 survey of visitors leaving the park showed that 44% of all summer visitors spend at least one night in Yosemite. The average length of stay for all visitors was two days.

The use patterns of concern for overnight visitors staying in Yosemite include the primary trips into and leaving the park (access trips), and circulation trips made once the visitors have reached their lodging or camping area. The average length of stay for visitors spending at least one night in Yosemite is 2.7 days, so the inbound and outbound access trips of overnight visitors are widely separated in time compared to day user access trips. Each day user present in the park generates 2.0 access trips per day, while each overnight user generates 0.54 access trips per day.

The access trips of overnight visitors may be made in and out the same gate, but many are part of a larger vacation itinerary that is better served by entering the park at one location and leaving at another. Data on the entry and exit locations of overnight visitors are not available, but parkwide visitor survey data suggests that Yosemite is the sole destination for less than half of all visitors, and that at least 57% of all trips enter and exit the park through different gates. Circulation trips of overnight visitors are more frequent than access trips, including short-distance travel to recreation opportunities near their overnight accommodations as well as longer excursions to remote areas of the park.

Visitors who stay overnight in lodging facilities near the park fall into two groups. The first is composed of destination visitors whose use of Yosemite is similar to that of the overnight visitors staying in the park. For these visitors, trips to and from the park are combined with circulation travel within the park. Most of these trips to and from the park probably enter and leave via the same gate. Once in Yosemite, these visitors make trips of varying length to reach features located within the park. The second group of overnight visitors staying in area accommodations includes visitors to Yosemite who are spending only one night in the area. These visitors will make only one trip between the park and their overnight accommodations. The majority of these visitors probably enter and leave the park at different locations and visit one or more park attractions as part of a through trip. Visitors staying overnight near the park account for about 17% of peak season visitation to Yosemite.

At least 50% of all visitor trips may enter and exit the park through different gates.

About 39% of the visitors to Yosemite do not spend the night in the park or in the immediate area. These visitors include vacationers stopping in the park on a through trip and area residents who travel to the park for a single day of recreation. Information is not available on the proportion of visitors who fall into each of these groups; however, most day use bus passengers visit the park as a part of a multi-day tour of western national parks and recreation areas. The area residents who visit the park are most likely to enter and leave via the same gate, but some may make a loop trip involving more than one gate.

About 70% of all Yosemite visitors travel to Yosemite Valley. Tuolumne Meadows attracts 37% of all visitors, followed by Glacier Point (27%) and Mariposa Grove (20%). Figure 4 shows that nearly two thirds of the visitors to Yosemite Valley also travel to one or more of the park's other major features.

The varied features and large size of Yosemite National Park result in complex visitor travel patterns and many trips through the park. Exit surveys showed a strong demand for travel across the Sierra Nevada Mountains through the park, of the visitors to Yosemite Valley, only 21% indicated that they entered and exited the park through the same entrance and visited only the valley. As a result, VTS service based at remote staging areas outside the park boundary would not serve current visitors well.

VISITOR EXPERIENCE

For the typical visitor to Yosemite, driving through the park provides the primary means of experiencing the park's views and vistas. Even on the busiest summer days, travelers on the park roads encounter only minor congestion, except at key activity areas and at the park entrance stations. As a result, driving into the park is usually a pleasurable experience, contributing to visitors' enjoyment of the park. The ability to make informal stops along the park roads to take advantage of the unique and varied scenery contributes to each visitor's opportunity to experience the park on his or her own terms. From the Big Oak Flat and south entrance stations, the drive into the park has a dense forest setting broken by occasional vistas to the west and clearings caused by recent forest fires. From the Arch Rock Entrance, the visitor travels through the narrow canyon of the Merced River along a winding road. The trip is highlighted by historic rock barrier walls, large granite boulders, and views of the river. The Tioga Road route offers broad alpine vistas of meadows, domes, distant peaks, and picturesque Tenaya Lake. Exfoliating granite surfaces along the Tioga Road provide a unique view of the geologic processes at work in Yosemite.

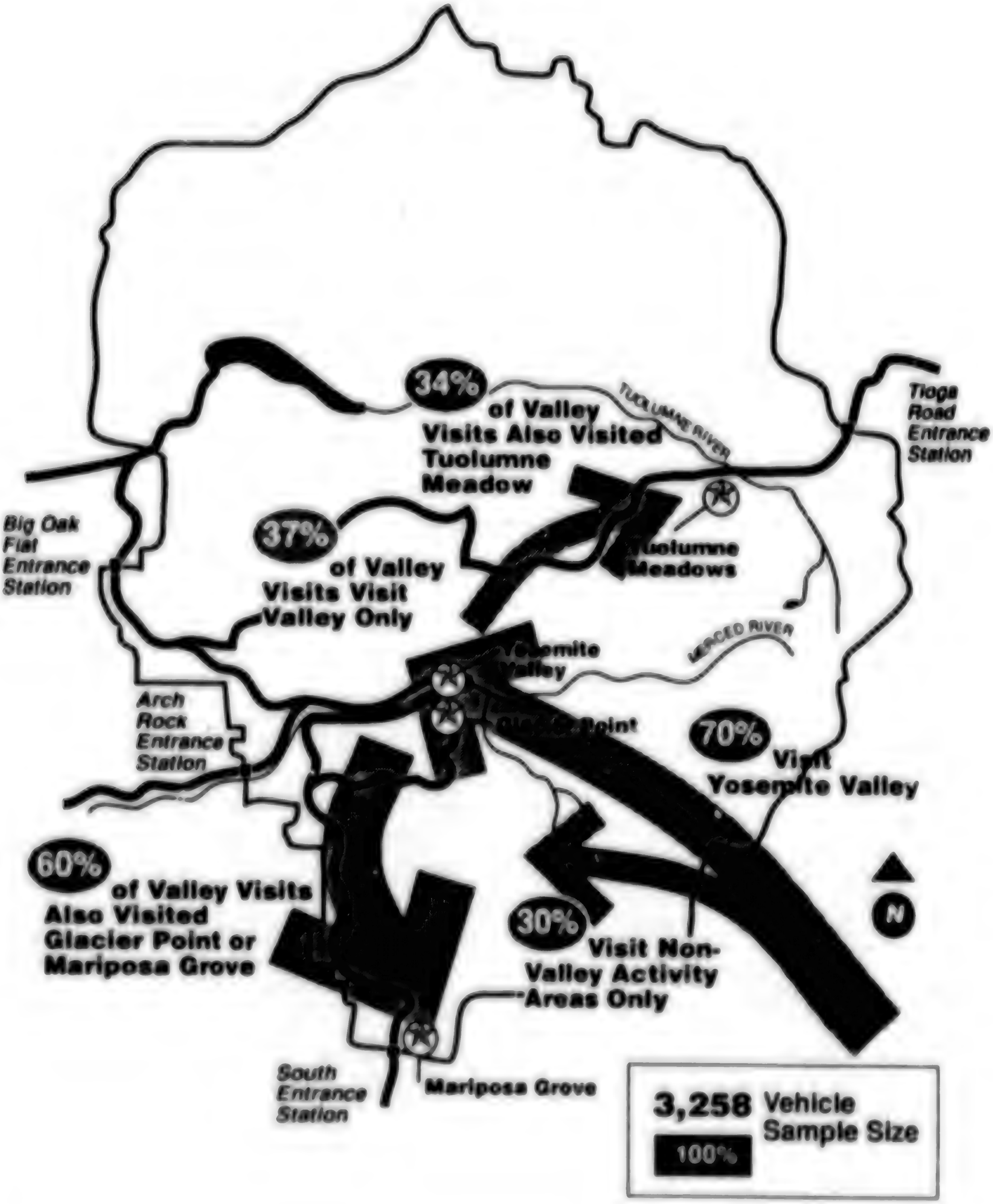
Approaching Yosemite Valley from the north and south, visitors are afforded views from above the lower canyon of the Merced River. Discovery View is a major viewpoint of Yosemite Valley located at the east end of the Wawona Tunnel on California Highway 41. The tall, dense trees in the valley hide the ribbon-like roads from the Discovery View vantage point, affording a view that reveals little or no evidence of human influence. Discovery View also offers a spectacular panorama including Bridalveil Falls and El Capitan in the foreground and the granite domes and cliffs of the east end of the valley in the background.

After reaching the valley floor, visitors have a true sense of arrival as they pass Bridalveil Falls and enter El Capitan Meadow, with a spectacular view of the sheer walls of the famous monolith. This is the point where visitors making through trips from south to north turn back to the west to reach Big Oak Flat Road near the west end of the valley.

Glacier Point road offers a distinctly different visitor experience from the main park roads. Traveling through high altitude forest habitat, the road passes through Bridalveil Meadow on its way to the viewpoints at Washburn Point and Glacier Point. The views of Little Yosemite Valley, Half Dome and the other major granite peaks surrounding the valley floor are unique. A sense of adventure and anticipation is heightened by the steep, winding decent taken by the road over its last mile to Glacier Point. At the point, visitors congregate along the rim overlooking Yosemite Valley. At times, visitors completely fill the available viewing area and begin to crowd one another. The capacity of the parking area and the viewing area appear to be in relative balance, since the Glacier Point area begins to feel crowded before all parking spaces in the lot have been occupied.

Figure 4: Yosemite National Park

Visitor Travel Patterns


34% of Valley Visits Also Visited Tuolumne Meadow
TUOLUMNE RIVER
Tioga Road Entrance Station
Big Oak Flat Entrance Station
37% of Valley Visits Visit Valley Only
Tuolumne Meadows
MERCED RIVER
Yosemite Valley
Arch Rock Entrance Station
Glacier Point
70% Visit Yosemite Valley
60% of Valley Visits Also Visited Glacier Point or Mariposa Grove
N
30% Visit Non-Valley Activity Areas Only
South Entrance Station
Mariposa Grove
3,258 Vehicle Sample Size
100%

VISITOR CHARACTERISTICS

The characteristics of Yosemite visitors and visitor groups were derived from a 1990-1991 survey conducted within the park and by mail.[5] Two park visitor groups were surveyed: 842 visitor groups traveling by private vehicle represented information on 1763 total visitors, and 155 visitor groups traveling by bus represented information on 450 total visitors.

Mode of Travel.

Travel by tour buses is the fastest growing mode of travel to Yosemite. Tour bus access to Yosemite was initiated in 1977, and by 1983 there were 3,021 tour bus trips. As shown in figure 5, in 1992 there were 13,313 bus tours – an increase of 1,144 trips per year, an average annual growth rate of 17.9%. Based on an estimated average occupancy of 40 persons per trip, bus visitors have increased from 5% of all recreation visits in 1983 to 14% of all visits in 1992. Tour bus travel can be expected to continue increasing, driven by aging of the population, increased visitation by foreign travelers, and increased emphasis on alternative transportation modes encouraged by The Intermodal Surface Transportation Efficiency Act and the California Department of Transportation.

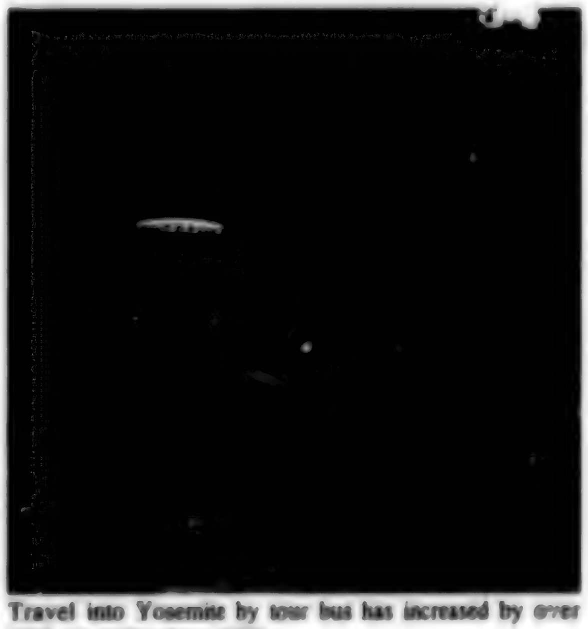
Origin

According to the visitor survey, 84.9% of the visitors traveling by private vehicle were U.S. residents and 15.1% were from foreign countries. The park is a regional attraction, with 63.8% of all private vehicle travelers coming from California. The Los Angeles Basin, the San Francisco Bay area, and the central valley were the most prevalent sources. No other state supplied more than 2.0% of private vehicle visitors, while eleven states accounted for between 1.0 and 2.0% of visitors. The United Kingdom and Germany, with 24.0% and 23.2%, accounted for the largest proportion of foreign private vehicle travelers. Other countries with between 5.0% and 10.0% of foreign visitors were Switzerland, Australia, the Netherlands, and France.

Of bus travelers, 45.0% were from foreign countries, with the United Kingdom accounting for 45.7% of the total or nearly 21% of all visitors traveling by bus. Australia and Germany were next, with 12.9 and 11.4% of foreign bus travelers, respectively. Of U.S. visitors traveling by bus, 56.5% (or 31.1% of all bus visitors) were from California. Only two other states – New York and Florida – accounted for more than 5% of visitors arriving by bus.

Age

The average age of all private vehicle visitors to Yosemite was 34.3 years. However, when visitors are separated by season, the pattern of families with children visiting the park in summer and older visitors frequenting the park during the off season is evident. The average age of summer visitors was 31.3 years compared to 38.8 years during the rest of the year. During the summer, 23.9% of the visitors were under 16 years of age, compared to just 7.9% during the off season. On the other end of the age spectrum, visitors more than 55 years of age comprised 19.9% of off season visitors, or nearly twice as many as during the summer (10.1%).



Travel into Yosemite by tour bus has increased by over 17% annually since 1983.

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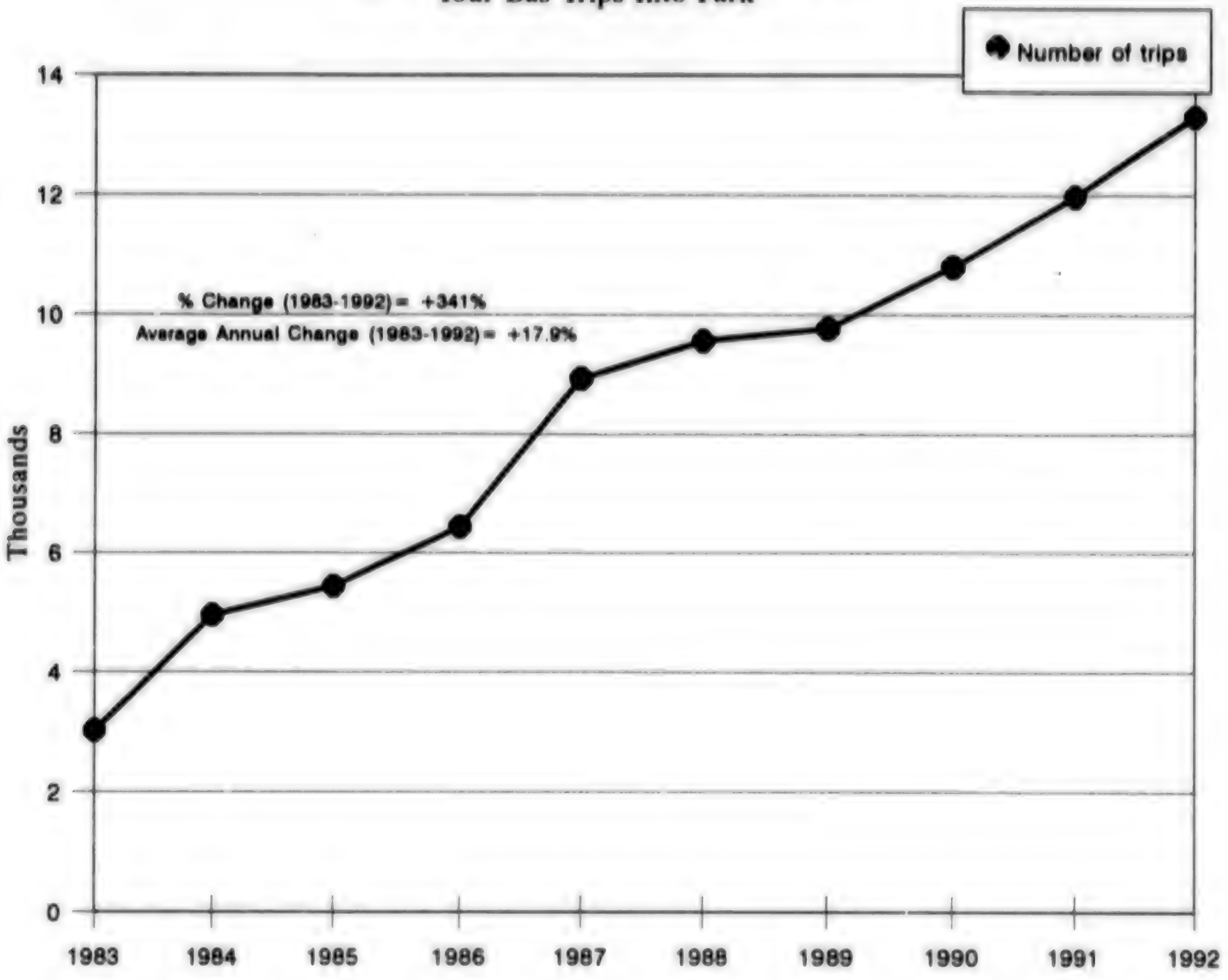
Figure 5: Yosemite National Park

Tour Bus Trips Into Park



% Change (1983-1992) = +341%
Average Annual Change (1983-1992) = +17.9%

SOURCE: National Park Service Denver Service Center Statistics Office

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Bus visitors are considerably older than those that visit by private vehicle. During the summer 31.1%, and during the rest of the year 35.9%, were more than 55 years of age. Given the disproportionate increase of tour buses over the last 10 years, senior visitors are the fastest growing segment of Yosemite visitors. Seniors also largely account for much of the documented growth in Yosemite visitation during the fall months.

Frequency of Visits

Overall, 60.4% of auto visitors were repeat visitors, which reflects the predominant use of the park by California residents residing within a relatively short distance. As would be expected, the opposite is true of bus travelers, with 65.4% visiting for the first time.

VISITOR FACILITIES

The map on the following page provides an overview of parkwide visitor attractions, parking areas, and lodging facilities located outside the three primary activity areas.

Parkwide Overnight Accommodations

There are a total of 5,062 overnight camping, backcountry and lodging units in Yosemite National Park, with 2,353 units, or 49%, located in Yosemite Valley. Overnight units are summarized by location in table 4. In addition to the concessioner lodging units in the park, some lodging is available in units located on private land in the park and at Yosemite West, located just outside the park boundary at the Chinquapin intersection. A total of about 50 cabins are located on private land in the Wawona area and an additional 10 to 20 units are available at Yosemite West.

Accommodations near the park include a 242-unit lodge and several bed and breakfast operations in Fish Camp, approximately 350 units in the El Portal area, several small lodges outside the Big Oak Flat entrance totalling less than 100 units, and a small resort located two miles east of the Tioga Road entrance to the park. The communities of Midpines (36 miles from Yosemite Valley), Mariposa (43 miles), Oakhurst (50 miles), Groveland (49 miles) and Lee Vining (19 miles from Tuolumne Meadows and 74 miles from Yosemite Valley) offer overnight accommodations within one to two hours' drive of the Valley and other park attractions.

The concession services plan, which provides the basis for a new concession contract to be finalized in 1993, calls for an overall reduction in parkwide lodging to 1,507 units. Much of the decrease in lodging would occur in Yosemite Valley, where lodging units would be reduced by 310 to a total of 1,215 units. A total of 41 units would be added to the Wawona Hotel as part of the plan.

The average peak day lodging occupancy of Yosemite can be estimated by applying average unit occupancy levels to the lodging inventory. Occupancy levels of 2.5 persons for lodging units and for the High Sierra Camps, and 3.0 persons for RV/camping facilities were assumed, as shown in table 5. The total overnight occupancy of the park, considering average party sizes, is just under 12,000 people. Approximately one half of that capacity is in the valley, which is expected to accommodate 5,964 overnight guests when the concession services plan is fully implemented. This overnight total is somewhat lower than the total overnight visitation target established in the general management plan, because it reflects typical occupancies for each unit rather than maximum capacities.

Of the 4,844 planned overnight units, 32% are hotel or housekeeping units. Of all overnight visitors, about 33% stay in hotel or housekeeping units, 12% stay in the backcountry, and 56% stay in RV, tent, or group camping areas accessed via park roads.

Table 4: Yosemite Overnight Accommodation Units

Accommodation Type	Yosemite Valley	Wawona	Tuolumne Meadows	Glacier Point Road	Big Oak Flat Road	Tioga Road	Hetch Hetchy	Other	Total
Hotel/Housekeeping	1,525	154[a]	69	0	0	28	0	0	1,776
RV and Tent Camping[b]	633	100	314	110	271	266	0	0	1,694
Tent-Only Camping[b]	184	0	0	0	0	0	25	0	209
Group Camping[c]	11	1	8	1	4	0	2	0	27
High Sierra Camps	0	0	0	0	0	0	0	56	56
Backcountry (people)	145	100	220	190	75	310	260	0	1,300
Total	2,498	355	611	301	350	604	287	56	5,062[d]

Table 5: Yosemite Overnight Visitor Capacity

Accommodation Type	Occupancy Per Unit	Valley Units	Valley Capacity	Other Units	Other Capacity	Total Units	Total Capacity
Hotel/Housekeeping	2.5	1,215[d]	3,038	342[a,d]	855	1,558[a,d]	3,893
RV and Tent Camping	3.0	633	1,899	1,061	3,183	1,694	5,082
Tent-Only Camping	3.0	184	552	25	75	209	627
Group Camping	30.0	11	330	16	480	27	810
High Sierra Camps	3.0	0	0	56	168	56	168
Backcountry	1.0	145	145	1,155	1,155	1,300	1,300
Total	2.5	2,188	5,964	2,655	5,916	4,844	11,880

Source: Yosemite Park Staff, Yosemite Park and Curry Co., BRW, Inc.

[a] Includes estimated 50 units on private land.

[b] Maximum occupancy for RV and tent sites is 6 people.

[c] Maximum occupancy for group camping sites is 30 people.

[d] Based on concession services plan.

Visitor facilities, including lodging, visitor information, retail and food services, are clustered in seven areas of the park. Many of these facilities are concentrated in the high-use areas of the park. Facilities in the Mariposa Grove/Wawona area, Tuolumne Meadows, and Yosemite Valley are discussed in later sections of this chapter. Other facilities in the park are discussed below.

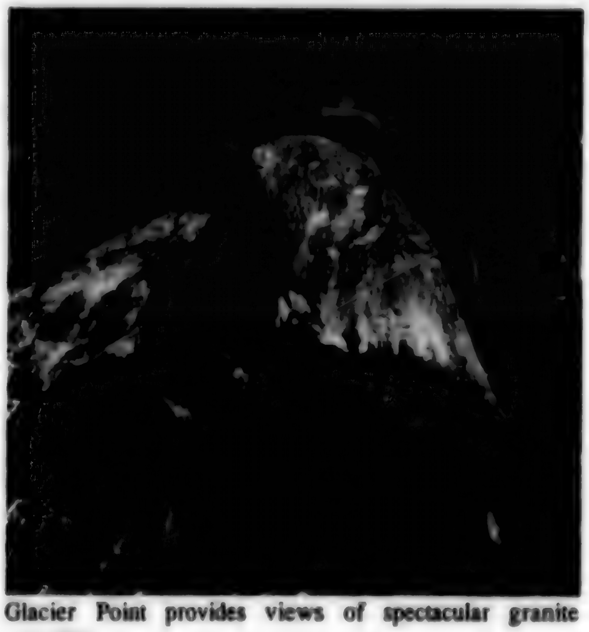
Glacier Point

Glacier Point, reached by a 16-mile road connecting to California Highway 41 at the Chinquapin intersection, provides spectacular views of Yosemite Valley and the surrounding granite monoliths. Now a major day use destination for both private vehicle and bus travelers, Glacier Point is the historic site of the Glacier Point Hotel (built in 1917) and the more rustic Mountain House (built in 1888). Both facilities burned in 1969. Lodging units are no longer provided at Glacier Point. The Bridalveil campground, with 110 sites, is on Glacier Point Road east of Badger Pass. A daily quota of 190 backcountry users are allocated to trailheads leading from three primary parking locations along the Glacier Point Road. In addition to the major viewing area at Glacier Point, the Washburn Point lookout offers spectacular views of Grizzly Peak and Little Yosemite Valley.

A concessioner-operated food service facility and gift shop is located at Glacier Point, along with restroom facilities. The concession services plan calls for the food service and gift shop to be relocated to the Glacier Point parking area.

Big Oak Flat

This area comprises the portion of California Highway 120 between the Big Oak Flat entrance and the intersection with Tioga Road at Crane Flat. There are no commercial lodging facilities in this area. Crane Flat contains a gas station and camp store which are open during the summer. There are two campground facilities with a total of 271 spaces in the area - one at Crane Flat and one at Hodgdon Meadows. A quota of 75 backcountry users are allocated to trailheads leading from this section of California Highway 120. Visitor information and camping reservations may be obtained from a small office located with the Mather District Ranger Station at the Big Oak Flat entrance. Restrooms are also provided just inside the Big Oak Flat entrance.



Glacier Point provides views of spectacular granite monoliths.

Two small groves of giant sequoia trees are located in this area. Near Crane Flat, Tuolumne Grove Road heads north from Tioga Road through the grove. This very steep one-way route is closed in winter. Merced Grove is reached via a walking trail connecting to a small parking area located to the north and east of Crane Flat along Big Oak Flat Road.

Tioga Road

Tioga Road is signed as California Highway 120 east of the Big Oak Flat road intersection, providing access to Tuolumne Meadows and Tioga Pass. Four campgrounds are located between Crane Flat and Tuolumne Meadows: Tamarack Flat, White Wolf, Yosemite Creek, and Porcupine Flat. They provide a total of 266 units. White Wolf, between Crane Flat and Tuolumne Meadows, is the site of a lodge with 28 tent cabins and dining facilities. A stable is also located in the White Wolf area. This area also has many trailheads, providing access for a daily quota of 310 backcountry users. Several turnouts furnish opportunities for viewing the high Sierra scenery, which provides a sharp contrast to the heavily forested environment of the lower elevations of Yosemite.

Hetch Hetchy

This area has a walk-in tent camping area with 25 sites accessible from the terminus of Hetch Hetchy Road at the reservoir. A daily quota of 260 backcountry users are allocated to trailheads leading from the Hetch Hetchy and northern Mather District areas.

El Portal

This area, located outside the park boundary, serves as an administrative support location for Yosemite. Along with several private lodging facilities, the area offers a service station and grocery store. Additional visitor services being relocated from Yosemite Valley may be relocated to the El Portal area as part of the Valley Implementation Plan.

Tioga Road east of the Oak Flat Road intersection provides access to Tuolumne Meadows and Tioga Pass.

Lodging Information and Reservations

The concession services plan calls for the provision of lodging information and reservations facilities at the Big Oak Flat, El Portal, and south entrance stations. These services will be of great benefit in reducing unproductive travel in and through the park by visitors hoping to spend the night in park lodging but who do not have confirmed reservations. Similar services for overnight camping and backcountry reservations and information, as well as general visitor orientation and trip planning, could be provided at the same facilities. At present, the only entrance station offering camping reservations and information services is Big Oak Flat.

Working with the gateway communities to provide advance information for visitor orientation and reservation services for overnight accommodations could further reduce unnecessary travel in the Yosemite region. Providing these services at gateway communities would give visitors information at a point where their travel and lodging plans could be changed more easily than at the park entrances. It would prevent backtracking by those unable to secure overnight accommodations, and in the event that day use reservations are instituted for Yosemite's major attractions, could avoid a great deal of visitor frustration. Establishing gateway community information centers could support the concept of intercepting at least some visitors at remote sites from which shuttle transit service could transport them into the park.

The five California counties surrounding Yosemite, Mariposa, Madera, Tuolumne, Mono and Merced, have begun a cooperative project with the Park Service and the California Department of Transportation to implement an advanced traveler information system for the greater Yosemite area. Known as the Yosemite Area Traveler Information Project, this venture will use a variety of communication technologies to advise travelers of conditions in Yosemite and recreation opportunities in the surrounding area.

TRANSPORTATION FACILITIES

Transportation facilities at Yosemite include roadways and parking areas. All transportation in the park, including VTS services, is provided by rubber-tired vehicles operating over the roadway system. Short segments of roadway in Yosemite Valley have been closed to general visitor access and are reserved for the valley shuttle system, vehicle access for disabled visitors, pedestrians, and bicycles. The park concessioner operates a tour service on a paved route through Mariposa Grove. Approximately 200 miles of roadway are accessible to the general visitor population at Yosemite.

El Portal provides lodging and NPS support facilities just outside the park.

Access to Yosemite National Park

Visitors traveling to Yosemite National Park arrive via ground transportation on one of four primary entrance routes. Private or rental vehicles and chartered tour buses are the major modes of travel into the park. California Highway 140 and California Highway 120 provide access from the west for the large population centers of northern California. California Highway 140 connects to California Highway 99, a principle north-south highway about 70 miles from the park at Merced, and travels through the gateway community of Mariposa on its route to the park.

San Francisco and Sacramento lie within 3 to 4 hours travel time of Yosemite and maintain their most direct access via California Highway 120, which intersects with California Highway 99 north of Modesto. The most direct southern access is through Fresno along California Highway 41. Travel time from Fresno to the park entrance is approximately 90 minutes. Travelers along California Highway 41 pass through the gateway communities of Oakhurst and Fish Camp en route to Yosemite.

Travelers from the east rely on California Highway 120 as the exclusive access route. California Highway 120 connects to US Route 395 at Lee Vining, about 15 miles from the Tioga Road Entrance Station. Reno, Nevada, is the major city closest to the park along Route 395.

Each state highway leading into Yosemite is a paved two-lane road built to carry traffic over mountainous terrain at moderate speeds. Entrance routes are characterized by segments of steep grades, winding curves, and narrower sections as they approach the park. The route with the most constraining geometric features is California Highway 140, which enters the park east of El Portal. Narrow roadway sections with tight curves present problems for larger vehicles, which have difficulty staying in defined travel lanes. Of special concern are large recreational vehicles, often rented by inexperienced drivers, and the 102-inch wide buses which have become prevalent in the tour industry over the last several years. Sheer rock walls adjacent to the road introduce technical challenges and resource preservation issues when evaluating improvement opportunities. The most critical segment of this road lies within the park boundary and is under NPS jurisdiction.

The town of Oakhurst has historically been a congestion point for traffic along California Highway 41 south of Yosemite. A traffic signal has been installed, which helps to manage the traffic flow through this growing gateway community much more efficiently. Proposals have also been presented for widening the road to four lanes north from Fresno to Oakhurst. The improvement would have little impact on road capacity to the park, since significant speed and capacity constraints exist along the section of road between Oakhurst and the park entrance.

Both east and west routes of California Highway 120 into the park offer relatively efficient access for traffic. The main congestion points are at the park entrance gates during high use days. The opportunity exists to expand the Big Oak Flat entrance at its present location, but the Tioga Pass entrance station would likely require relocation if expanded. The roadway section directly east of the Tioga Pass entrance has very steep cross slopes, making it inappropriate as an alternate location for the entrance station. A more level section of road with good potential for pavement widening exists inside the park boundary to the west of the current entrance station.

The Yosemite Road System

The highways leading into Yosemite transition into the internal parkwide road system. The State of California has no rights-of-way through the park, so there are no state highways within its boundaries. State route numbers are used on park signs to help orient visitors. Additional transportation facilities within the park consist of a series of spur roads, access drives, and parking areas leading from these main roads.

The parkwide road system does much more than simply facilitate travel to specific locations. The major intent of roadway designs in Yosemite has been to provide vistas and enhance enjoyment of the park. A slower speed is necessary and advantageous on these facilities. VTS and park concession tours also share certain segments of roadway with private vehicles as part of the continuing effort to reduce the impacts associated with private vehicular transportation in the park.

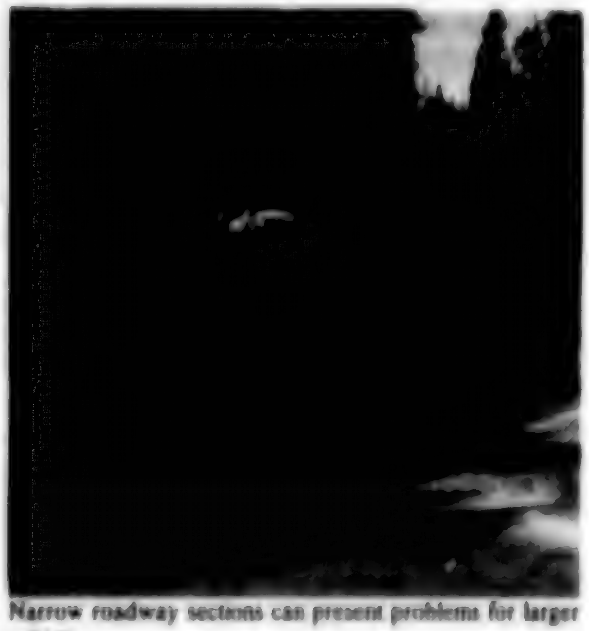
Although several class III (special purpose roads providing access to public use areas) and administrative roads connect to the main roads, this discussion is limited to the five primary park roads within Yosemite. The loop road system in Yosemite Valley is discussed in a later section of this chapter. The following primary facilities are all paved roadways and designated as class I (main routes, tour routes or thoroughfares):

- Arch Rock Entrance Road - west park boundary to valley floor (7.75 miles)
- Big Oak Flat Road - west park boundary to valley floor (17.84 miles)
- Wawona Road - south entrance to valley floor (26.86 miles)
- Tioga Road - Crane Flat to Tioga Pass entrance (46.73 miles)
- Glacier Point Road - Chinquapin to Glacier Point (15.80 miles)

Arch Rock Entrance Road. This road is California Highway 140 outside park boundaries. It is open year round and provides the most direct access to Yosemite Valley. The road is characterized by steep, rocky canyon walls with small river flats and terraces and has a typical pavement width of 19 feet. Sharp curves and rock outcroppings adjacent to the road edge make the route challenging to drive and unsafe for oversized vehicles. Arch Rock Entrance Road enters the park at the El Portal administrative site, passes through the Arch Rock entrance, and joins the Big Oak Flat Road one mile west of Pohono Bridge in Yosemite Valley. The road serves as a through route via connections to other principle park roads, and was historically called the All-Weather highway, due to its lower elevation and lack of snow.

Big Oak Flat Road. Big Oak Flat Road is also maintained for year-round access and may be used as a through route with other major park roads. Outside the park, this road is signed as California Highway 120. It leads from Big Oak Flat entrance through Hodgdon Meadow and Crane Flat, and joins the Arch Rock entrance road about a mile downstream from Pohono Bridge on the valley floor. The topography changes from mountainous on the east end of the road to rolling at the west end. The paved roadway section ranges from 26 to 30 feet in width and provides primary park access to

Hodgdon Meadows, Merced Grove, Crane Flat, Foresta, and Yosemite Valley.



Narrow roadway sections can present problems for larger vehicles.

Wawona Road. This road provides principle access to Wawona, Mariposa Grove, Badger Pass Ski Area, Glacier Point, and the valley floor. Throughout its length, the road travels over mountainous terrain with steep grades surrounded by moderate to dense forest. The Wawona Tunnel is a major feature, located along the Wawona Road just before its descent into Yosemite Valley. Pavement width is 24 feet. Maintained for year-round access, the Wawona Road is California Highway 41 outside the south park boundary and can be used as a through route with all other major roads in the park.

Tioga Road. Tioga Road provides the only access to the park from the east, and accommodates trans-Sierra traffic while it is open during the summer months. No access is available during the winter. Outside the park to the east, Tioga Road is designated as California Highway 120. Inside the park, the road extends from the Tioga Pass entrance on the east to the intersection with Big Oak Flat Road at Crane Flat on the west. The road has a nominal 20-foot pavement width and is characterized by rolling subalpine highlands with sections of mountainous terrain, valley flats, and highland meadows. At 9,945 feet above sea level, the Tioga Pass entrance is the highest elevation traversed by any road in the park. The road provides direct access to Tuolumne Meadows, the high Sierra, White Wolf, Crane Flat, and the rest of the park via connections with other roads.

Tioga Pass entrance station provides the only park access from the east.

Glacier Point Road. Glacier Point Road intersects the Wawona Road at Chinquapin, serves the Badger Pass Ski Area, and travels on to Glacier Point. It provides year-round access to the Badger Pass Ski Area but is closed beyond the ski area in the winter. The primary summer destinations beyond the ski area include Bridalveil Creek campground, the Taft Point and Sentinel Dome trailheads, and Glacier Point lookout. Heavily forested mountainous terrain makes up most of the roadway topography. Pavement width varies along the route, becoming quite narrow over the last one to two miles. Steep grades and switchbacks make bus access difficult between Washburn Point and the Glacier Point parking area. Glacier Point Road is the only dead end route of the five principle park roads. Improvements have been planned for this roadway over the next decade.

Visitor Parking Facilities

Visitor parking areas are provided in all the primary developed areas throughout the park. Scattered pullouts along the main roads provide access to interpretive signs and viewpoints. The parking inventory conducted as part of this study focused on areas of high visitor use where parking demand is greatest, and those locations that could be most affected by implementation of alternate transportation modes. Three particular subareas in the park were evaluated for parking and use — Yosemite Valley, Wawona and Mariposa Grove, and Tuolumne Meadows and Tioga Road. Parking conditions for these areas are discussed in later sections of this chapter.

Three primary roadway corridors account for the parking outside the three activity areas listed above. The Tioga Road corridor west of the Tuolumne Meadows activity area serves numerous access points for climbing and hiking in the high Sierra. The route between Yosemite Valley and Glacier Point is also a popular use corridor and offers several hiking and viewpoint parking areas. Finally, Big Oak Flat Road between Yosemite Valley and Big Oak Flat Entrance station also serves a variety of activity areas that are reached from small parking facilities.

Tioga Road Parking Areas

- Cathedral Lakes Trailhead (10 parking spaces). The John Muir trail begins at this location and is popular for hikers and backpackers. Parking in this gravel lot typically over-flows onto the shoulders of Tioga Road.

- Tenaya Lake Picnic Area (70 parking spaces). This gravel parking lot on the eastern edge of Tenaya Lake is the single largest parking area along Tioga Road outside of Tuolumne Meadows. Parking at this location is usually for short-term visits to Tenaya Lake.

- Murphy Creek Trailhead (25 parking spaces). Most of the parking activity at Murphy Creek is associated with day hikers and backpackers. The gravel lot often has insufficient capacity for the parking demand at this location.

- Sunrise Lakes Trailhead (23 parking spaces). Sunrise Lakes trailhead is one of the most heavily used trailheads in the area, as indicated by the parking activity in the gravel lot. Long-term parking is common at this location due to the length of trails originating at the trailhead.

- Olmsted Point (65 parking spaces). This paved and striped parking area provides access to a spectacular panorama of the park from an elevation of over 8,000 feet. Most visitors will park for very short durations as part of their trip to other destinations. Access to and from this lot can be dangerous due to the roadway grades and curves in both directions. Sight distance is restricted for vehicles leaving the lot and for traffic on Tioga Road.

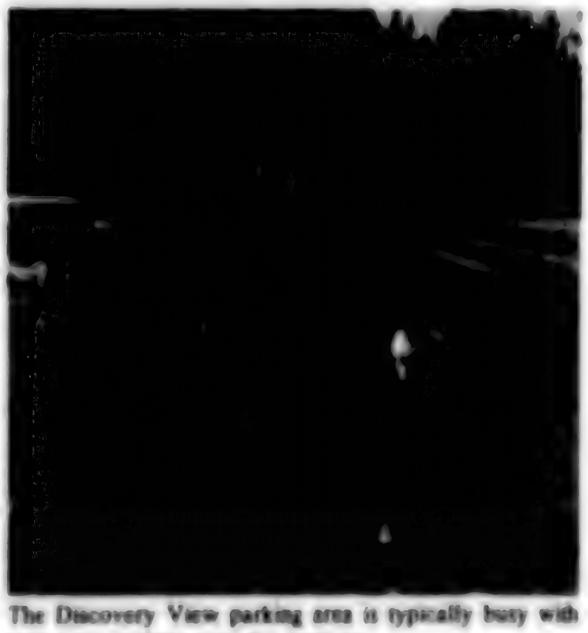
- Informal parking locations along Tioga Road:

    - Tuolumne Meadows strip parking
    - Cathedral Lakes trailhead strip parking
    - Pothole Dome access
    - Glen Aulin trailhead
    - East Cottage Dome access
    - Fairview Dome access
    - Daff Dome access
    - Hammer Dome access
    - Lamb Dome access
    - Lamb/Mariuolumne Dome access
    - Whiz Dome access
    - Medlicott Dome access
    - Fisherman's Trail/Main Medlicott Dome access
    - Low Profile Dome access
    - Dosier Dome access
    - Phobos Cliff/Pywiack Dome access
    - Main Pywiack Dome access
    - Tenaya Lake strip parking
    - Stately Pleasure/[illegible] Dome access
    - Murphy Creek Trailhead strip parking

- Tenaya Lake turnouts
- Sunrise Lakes trailhead strip parking
- Olmsted Canyon access

Yosemite Valley to Glacier Point Parking Areas

- Discovery View north lot (32 auto parking spaces, 2 bus parking stalls). Discovery View, also known as Tunnel View, is a common brief stop for most first-time travelers on this section of the Wawona Road. The paved and striped parking area provides access to an unspoiled view of Yosemite Valley from the western end. The Yosemite Valley tram tour makes a brief stop here, allowing passengers to leave the vehicle for viewing and photo opportunities. Through traffic at this location must be cautious of vehicular and pedestrian movements due to its proximity to the Wawona Tunnel and roadway curves which limit sight distances.



The Discovery View parking area is typically busy with pedestrian activity near the roadway.

- Discovery View south lot (24 parking spaces). This paved and striped parking area is a supplement to the north lot directly across California Highway 41. There are dangerous pedestrian conditions as visitors cross the highway to reach Discovery View.

- Badger Pass ski area (700 parking spaces). The parking area at Badger Pass is only used during the winter ski season. Several levels of paved parking step up the hillside adjacent to the ski area.

- Ostrander Lake trailhead (25 parking spaces). Hikers, backpackers, and picnickers are the typical users of this gravel lot.

- Mono Meadow trailhead (20 parking spaces). The trailhead from Mono Meadow provides access to several trails through the south central portions of the park. The gravel lot is primarily used by hikers, backpackers, and picnickers.

- Sentinel Dome/Taft Point trailheads (30 parking spaces). This lot adjacent to Glacier Point Road provides access to two popular trailheads leading to overlooks of Yosemite Valley. It is used primarily by visitors using the area for less than half a day.

- Washburn Point (39 parking spaces). Washburn Point provides an overlook of Little Yosemite Valley and a dramatic view of Half Dome. Visitors typically stop only momentarily, since the paved and striped lot is less than 1 mile from Glacier Point.

The Glacier Point parking area provides efficient parking and access to the popular vantage point.

- Glacier Point (194 auto parking spaces, 5 bus parking stalls). This vantage point overlooking Yosemite Valley is a major attraction for many park visitors. The two-level parking area is paved and striped and provides efficient circulation and adequate capacity for the existing activity levels. Parking is short term due to limitations of viewing areas and trails. Buses are accommodated separately with designated parking stalls and a three-vehicle loading zone for bus passengers near the front of the lot.

Big Oak Flat Road Parking Areas

- Big Oak Flat Visitor Information Center and Mather District Ranger Station (21 parking spaces). Many visitors entering the park stop at this location for orientation, maps, and camping registration. Vehicle turnover is frequent due to limited visitor services. The area is paved and striped with some additional parking located adjacent to the lot along the road.

- Merced Grove (8 parking spaces). Access to the Merced Grove is provided from this small pullout. Parking stays are typically brief, allowing visitors a quick tour through the grove of giant sequoias.

- Crane Flat Service Center (21 parking spaces). The paved parking area provides spaces for service station and store customers. Use is steady throughout the day but for very short stays.

- Tuolumne Grove access, upper lot (20 parking spaces). This lot lies at the junction of Tioga Road and Old Big Oak Flat Road. The Tuolumne Grove of giant sequoia trees is located just one mile down Old Big Oak Flat Road. Some visitors choose to hike to the grove from the upper lot to avoid the 6-mile drive out along the one-way narrow winding road. Larger vehicles, unable to negotiate the road, also commonly use this lot. The northbound one-way road intersects with Big Oak Flat Road near the park entrance station and is only open in the summer.

- Tuolumne Grove access, lower lot (18 parking spaces). A gravel lot is provided at the trailhead to Tuolumne Grove for visitors who have ventured down the steep and winding roadway in their private vehicles to gain direct access. Walking the main trail takes between 15 and 30 minutes and visitors usually do not stay for extended periods. Overflow parking occurs along the narrow access road when the lot is full.

Big Oak Flat entrance offers visitor orientation and information services.

- Additional parking locations along Big Oak Flat Road include:
  - Big Meadows overlook, four miles west of Foresta Road (15 parking spaces)
  - Valley View lookout between Foresta and west tunnel (10 parking spaces)
  - Valley View turnouts just east of west tunnel (12 parking spaces)
  - Cascade Creek turnouts (10 parking spaces)
  - California Highway 140/Big Oak Flat Road intersection, north lot (13 parking spaces)

- California Highway 140/Big Oak Flat Road intersection, south lot (5 parking spaces)

PARKWIDE TRANSPORTATION SERVICES

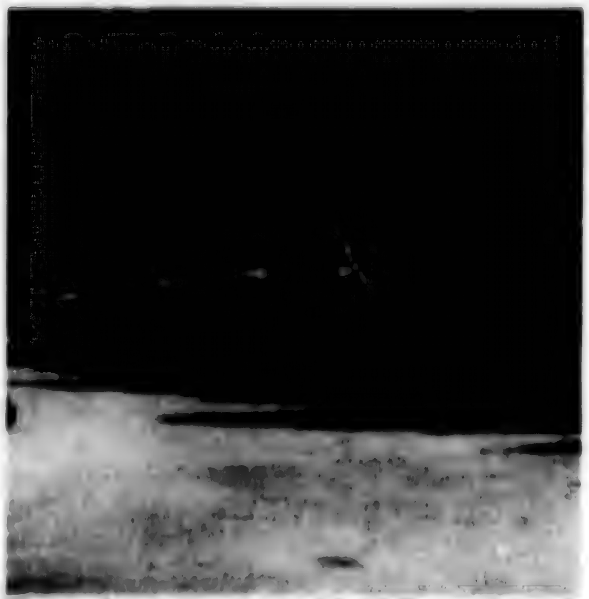
Public Transit Service

Public ground transportation to Yosemite is available year-round from Merced on public bus lines. Yosemite Transportation System offers service to Lee Vining from June 13 through Labor Day. These public ground transportation services can be linked to air, train, and other bus services, with transfers in satellite communities. Stops in Mariposa can be prearranged as part of the trip to Merced. Two roundtrips per day are generally offered on each public transportation route serving the park. Reservations are recommended by each of the operators of these services. Mariposa County began operating a public transit bus line oriented primarily toward transporting Yosemite employees from Merced to the valley during 1992. Several morning and evening trips serve the California Highway 140 corridor, carrying students as well as employees.

Charter Tours

A substantial increase in bus traffic over the past few years has presented special challenges to park management. Segments of the park roads are difficult to navigate for many of the larger buses, and the weight of the vehicles has accelerated road surface deterioration. Narrow lanes, especially along the Arch Rock Entrance Road, force buses into oncoming lanes, creating dangerous conditions for general traffic.

The key destination for charter tours, and the only formal bus parking provided in Yosemite Valley, is at Yosemite Falls. Twelve bus stalls are provided at the falls, but loading and unloading areas are insufficient for the volume of buses entering the park on peak summer days. A large proportion of the bus passengers go to Yosemite Lodge for overnight accommodations or meals. The absence of any designated bus staging area at the lodge forces buses to share shuttle service lanes and private vehicle parking areas.



Charter buses present special challenges to park management

Although Yosemite Valley has the highest concentration of charter buses, other parts of the park also receive large numbers of bus trips. Charter tours typically enter the park at one gate and exit through another to maximize the opportunities for passengers to view Yosemite features. An average of 63 buses per day currently enter the park in peak months. Most buses stop at Mariposa Grove, where simultaneous arrivals occasionally exceed the supply of designated bus parking stalls. Glacier Point has the best ability to accommodate charter buses, due to the short length of stay and provisions for parking; however, the steep and winding road leading to the parking area is not well suited to heavy bus traffic. The greatest problems in accommodating tour buses occur along Tioga Road in the Tuolumne Meadows area. Virtually no facilities are designed for bus access. Charter buses attempt to park near the most popular features for their passengers' convenience and leisure, causing conflicts with traffic along the road and accelerating damage to vegetation and soils along the road edges.

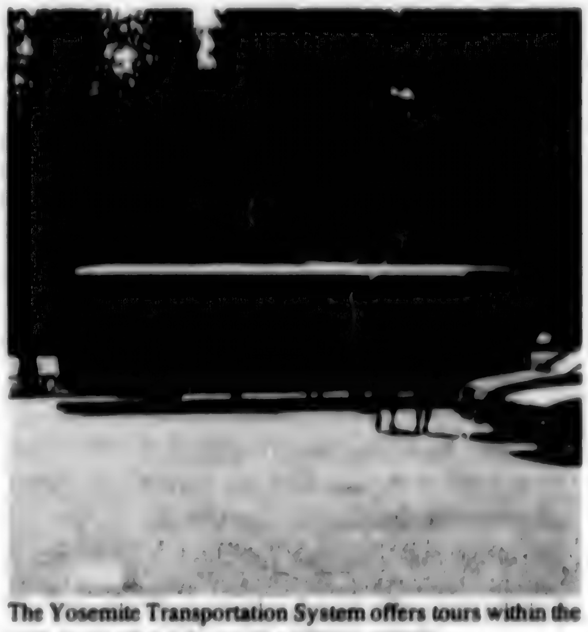
Charter bus activity has developed into a major component of visitor access. Trends indicate increasing volumes of buses can be expected in the future. Many of the satellite communities are aggressively attempting to capture the business that tour buses can provide. While some bus traffic restrictions may be necessary, visitor management benefits can also be realized by providing adequate accommodations for charter bus transit services that may, in the long run, reduce overall traffic volumes in the park.

VTS Services

The National Park Service offers several VTS routes inside the park free of charge to visitors who pay the park entry fee. These include operations intended to provide access to key activity areas and circulation systems designed to alleviate congestion and pollution created by private vehicles. The visitor transportation system is operated and maintained by the major park concessioner. To allow the shuttle systems to operate with no direct fare payment by users, they are funded by revenues generated from surcharges added to goods and services sold by the concessioner within the park. This arrangement causes overnight guests to pay a disproportionate amount of the VTS costs.

Current visitation levels during the peak season have often caused the shuttle systems to reach their capacities, resulting in delays and irregular service. Parking problems and high traffic congestion levels have also created difficulties in providing efficient transit operations. The visitor transportation systems include the valley shuttle, the Mariposa Grove shuttle, the Tuolumne Meadows shuttle and Tioga Road Express. The operations of these VTS services are documented in existing conditions descriptions provided for each of the major visitor activity centers in later sections of this chapter.

A variety of tours are available inside the park for visitors choosing to explore by means other than private vehicle. Services are provided by Yosemite Transportation System, which is operated by the major park concessioner. Several of these routes originate from the lodging facilities located in Yosemite Valley while other services serve areas of concentrated activity. Brief descriptions of these services are included below.



The Yosemite Transportation System offers tours within the park as an alternative to the private vehicle.

Glacier Point Tour. Yosemite Transportation System offers daily bus tours to Glacier Point, where visitors can view Yosemite Valley from over 3,000 feet above its floor. The tour involves a 32-mile one-way trip from Yosemite Valley over Badger Pass to the end of Glacier Point Road. Time is allowed for sightseeing and photographing the spectacular scenery from the various view points along the route. Standard 49- and 53-passenger coach buses are used to carry visitors for this tour. The tour takes four hours and is priced at $17.50 per person. A one-way option is offered for visitors wishing to walk the four-mile trail between the valley floor and Glacier Point.

Big Tree Tour. Tours are offered daily from Yosemite Valley to visit the giant sequoia trees in Mariposa Grove, stopping at Glacier Point on the return trip to the valley. Visitors are transported via a coach bus to the grove, where they can take the tram tour or a self guided walk through trees. The buses make a stop at the Wawona Hotel and also allow for some passengers to transfer buses at Chinquapin if they choose not to travel to Glacier Point on the return trip. A fee of $27.50 is charged for the Big Tree tour, which lasts approximately five hours.

Grand Loop Tour. A full day trip is offered for visitors wishing to see all the major attractions in Yosemite National Park without driving. An average of two buses per day will make the loop; five buses are available on demand for extra trips. Visitors are taken to Mariposa Grove, Glacier Point, and Tuolumne Meadows in 53-passenger coach buses. This tour allows visitors with limited time to see a large portion of the park in one day. The cost to take the Grand Loop Tour is $37.75 per passenger.

Badger Pass Shuttle. A special shuttle service is provided during the ski season for visitors needing transportation between the Badger Pass ski area and lodging facilities located in the valley. The ski area shuttle system transports about 25,000 passengers seasonally. The cost of this shuttle service is included in the ski pass fee.

PARKWIDE TRANSPORTATION CONDITIONS

Growth in visitation to Yosemite National Park has translated into a steady increase in vehicles traveling on the park road system. Vehicular traffic increased at rates similar to visitation, but tour bus trips into the park have more than doubled since 1985. Vehicle management has become an increasing challenge as traffic levels have increased. It has been difficult to expand transportation facilities to meet the growing demand.

Entrance Station Volumes

According to 1992 peak season statistics, vehicle access is distributed quite evenly among the four primary park entrance stations. Entry percentages, range from 22% at Tioga Pass to just more than 27% at the south entrance. Twenty-four percent of vehicle entries occur at the Arch Rock station and at the Big Oak Flat station. The remaining 2% of visitor entries occur at the Hetch Hetchy entrance, which does not provide a link to the other park roads. Peak season (May through September) distribution of vehicle entries is shown on the accompanying map, with the average daily entries listed for the peak summer month. During August 1992 a daily average of 6,950 vehicles, including 61 buses, entered Yosemite National Park.

Traffic Volumes

Daily traffic volumes recorded at fixed counter locations within the park indicate a steady growth in traffic, but none of the major roadways are over capacity. Capacity and congestion problems have been created by bottlenecks at entrance stations, popular attractions, parking areas, and major intersections. Disruptions to traffic flow are often attributed to excessive circulation by visitors and tour bus drivers seeking parking spaces. July and August have traditionally been the peak visitation months over the last several years. Traffic count information was obtained for July of 1991 as a representative data set for peak summer activity. The attached map on page 41 displays average daily two-way volumes at each counter location. Supplemental figures and appendix 5 document specific directional average daily movements for the years 1988 through 1991.

Yosemite Valley. The highest daily traffic volumes in the park are found in Yosemite Valley. An average of 5,600 vehicles per day entered the valley in July, 1991. Two one-way travel lanes accommodate this volume. Approximately 70% of the traffic occurs between the hours of 10:00 a.m. and 6:00 p.m., with the peak hour occurring between 12:00 and 1:00 p.m. The peak hour volume during the entire month averages 550 vehicles but reaches 1,100 vehicles during the busiest days. Figure 6 shows the trend of traffic volumes entering and leaving the valley since 1988.

Average daily volumes exiting the valley past Sunnyside Campground (6,300) are found to be higher than the entrance volumes. This

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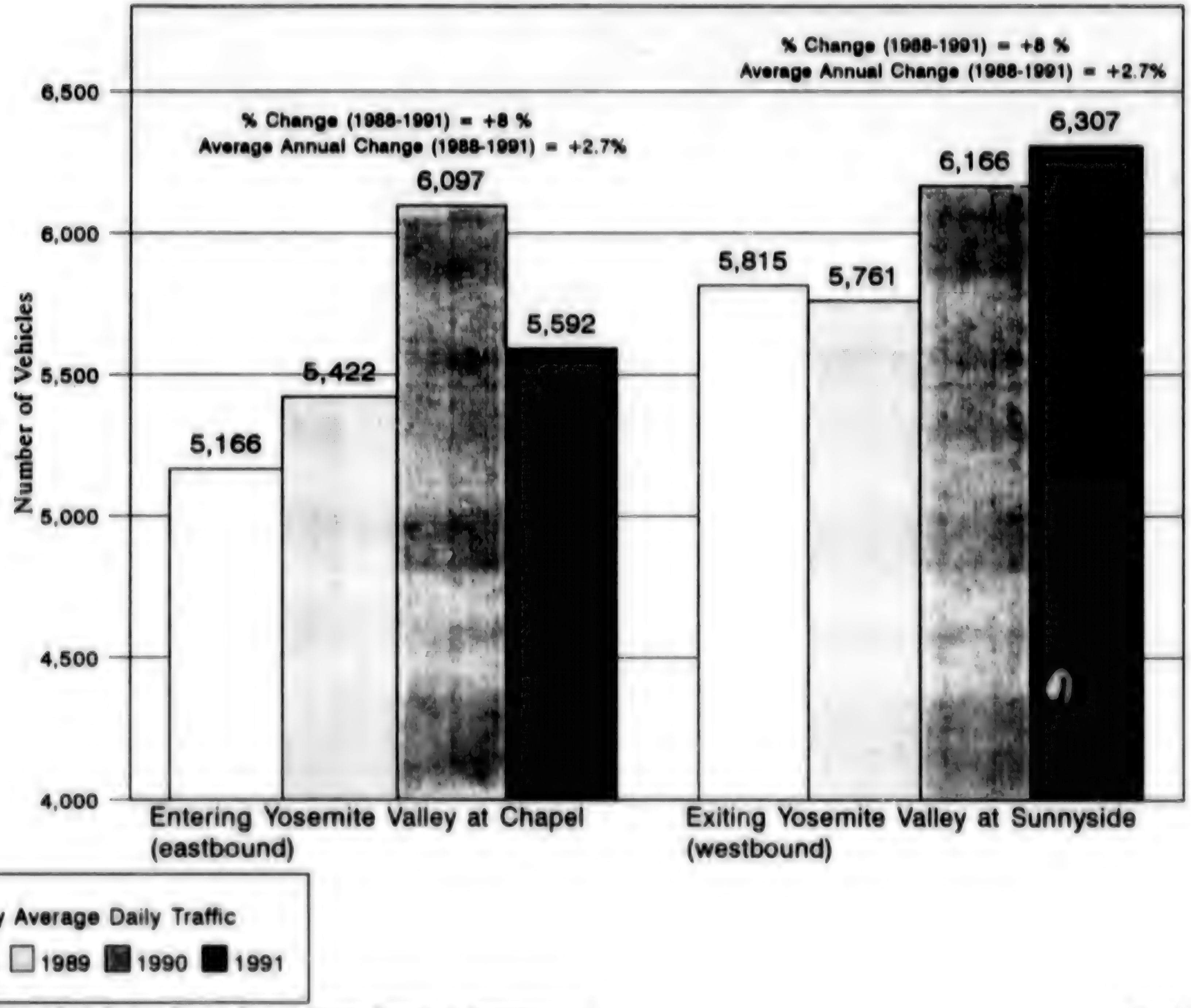
Figure 6: Yosemite National Park

Traffic Counts at Valley Chapel and Sunnyside Campground



SOURCE: National Park Service Denver Service Center Branch of Transportation

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imbalance may be due to an overlap in the departure times of overnight guests and day use visitors, and the commuting patterns of resident employees. Two one-way travel lanes also serve traffic exiting the valley. The peak hour for exiting traffic occurs between 4:00 p.m. and 5:00 p.m. and averaged 670 vehicles per hour throughout the month. About 70% of the daily exiting traffic in the valley occurs over an eight hour period beginning at 11:00 a.m.

Crane Flat. The intersection of Tioga Road and Big Oak Flat Road carries the second highest traffic volume in the park. The east leg of the intersection carries average daily two-way volume of 5,150 vehicles. Vehicles destined for the valley from Crane Flat represent the highest single movement at the intersection. Traffic typically moves freely through this area, with some interruptions associated with travelers entering the Crane Flat Service Center, east of the intersection. The lowest two-way volumes at the intersection are found on the Tioga Road segment.

Figure 7 shows traffic volumes to and from Big Oak Flat entrance at Crane Flat for 1988 through 1991.

South Entrance. Traffic volumes at the south entrance station have increased steadily over the last four years. Overall traffic volumes increased 15% at the south entrance between 1988 and 1991. Daily traffic volumes are well balanced between entries and exits, but may not represent the same vehicles. The close proximity of the south entrance to Mariposa Grove offers visitors the opportunity to link their park entrance or exit trip with a tour of the giant sequoia trees. A two-way daily average of 3,750 vehicles pass through the south entrance station. Traffic trends at the south entrance intersection are shown in figure 8.

Tioga Pass Entrance. Traffic activity at this location has grown rapidly in the last two years. Average daily two-way volumes increased by nearly 200 vehicles for the month of July between 1990 and 1991, after two years of relatively constant volume. Slightly more entries are made at the Tioga Pass entrance than exits, with a 52% to 48% split. Yosemite staff members have also noted an increase in bus traffic at Tioga Pass in recent years. Although parkwide estimates confirm the increase in overall bus traffic, actual station counts are not currently available. Figure 9 shows 1988 through 1991 traffic counts at the Tioga Pass entrance.

Arch Rock Entrance. As shown in figure 10, the Arch Rock entrance experienced a 10% increase in July average daily traffic volume between 1990 and 1991, while volumes had actually decreased slightly in 1989. Inbound volumes were approximately 50 trips higher than outbound during an average day. A total of 2,950 vehicles were counted in both directions. According to the 1992 peak season entry statistics, Arch Rock serves as the park entry and exit point for the same proportion of visitors as Big Oak Flat. Directional counts are not recorded at the Big Oak Flat station, but based on the activity at Crane Flat, the balance of traffic may be higher for outbound trips. Because California Highway 120 and California Highway 140 both connect to California Highway 99 west of the park, some travelers probably make trips through the park by entering Yosemite at one of these stations and exiting at the other.

Glacier Point Road. Visitation and traffic volumes along the Glacier Point Road have increased steadily over the past several years. As shown in figure 11, traffic volumes increased 22% between 1988 and 1991. The 1991 traffic volumes indicate that Glacier Point visitation is at or near the limits identified in the general management plan.

ENVIRONMENTAL CONDITIONS

This overview of environmental resources in Yosemite National Park summarizes and interprets information derived through published sources, site visits, and discussions with park and other NPS personnel. Environmental resources and issues addressed include geology, soils, air, water, vegetation, wildlife, cultural and visual.

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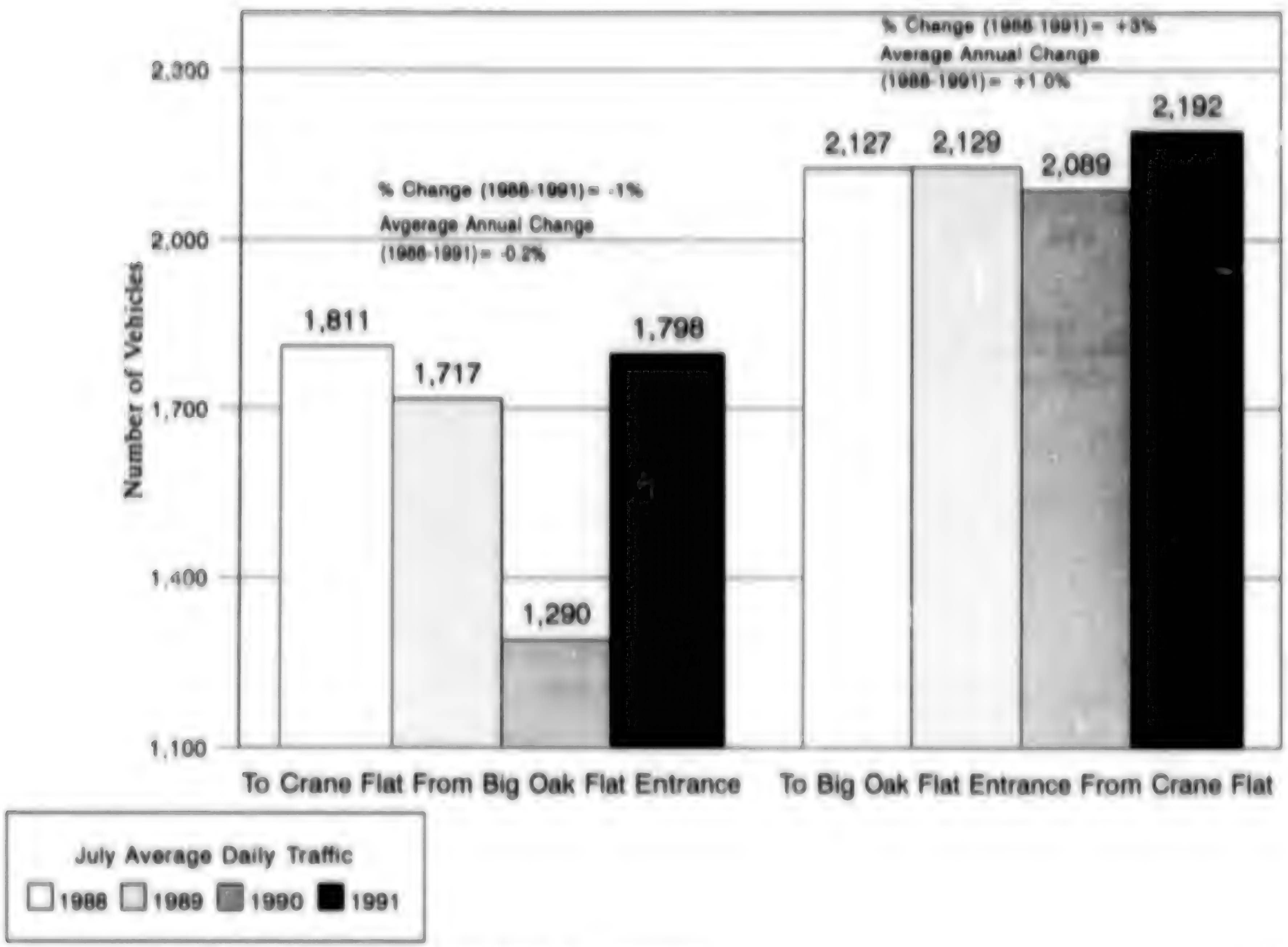
Figure 7: Yosemite National Park

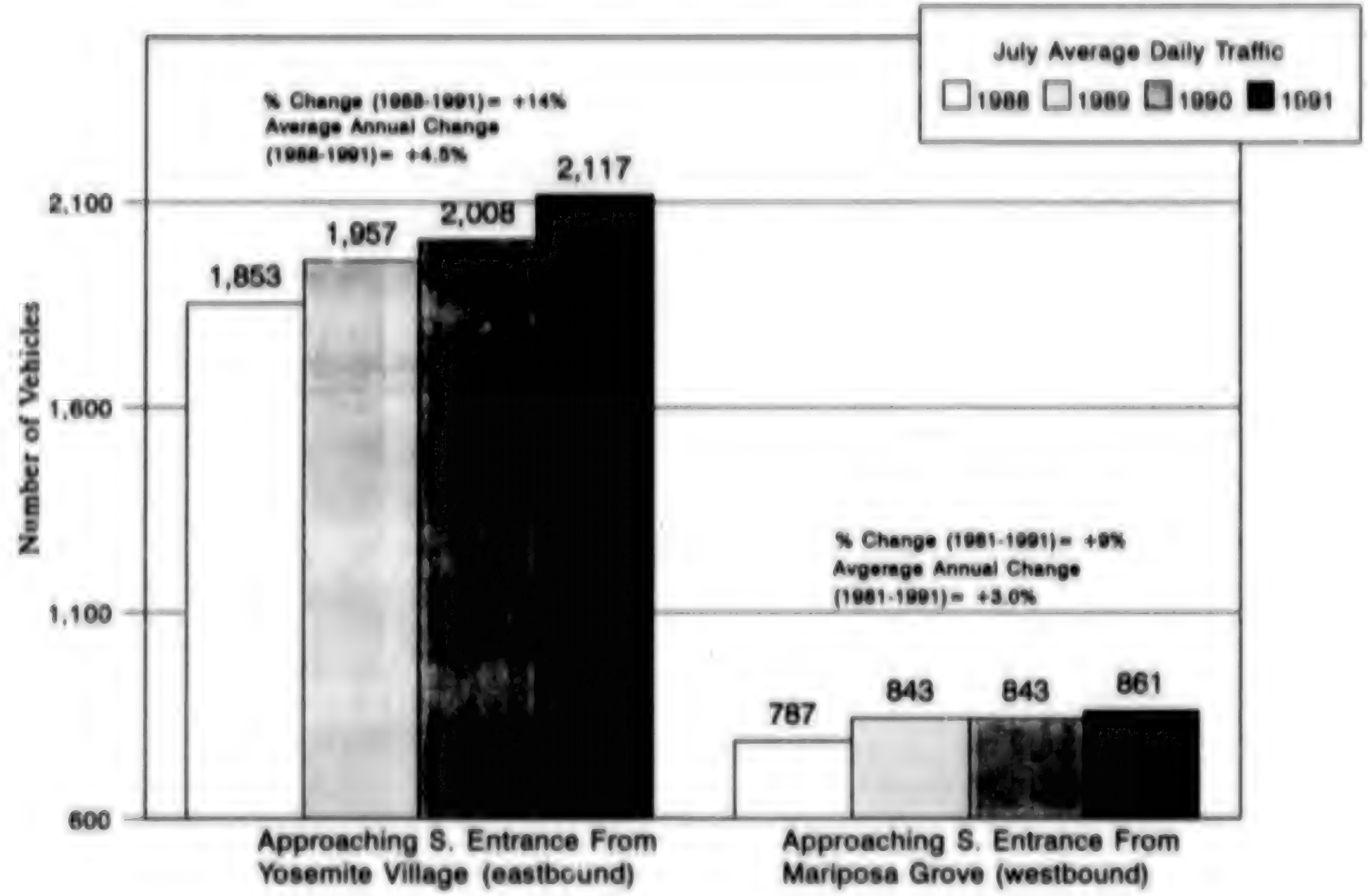
Traffic Counts on Big Oak Flat Road, West of Tioga Pass Road



SOURCE: National Park Service Denver Service Center Branch of Transportation

Figure 8: Yosemite National Park

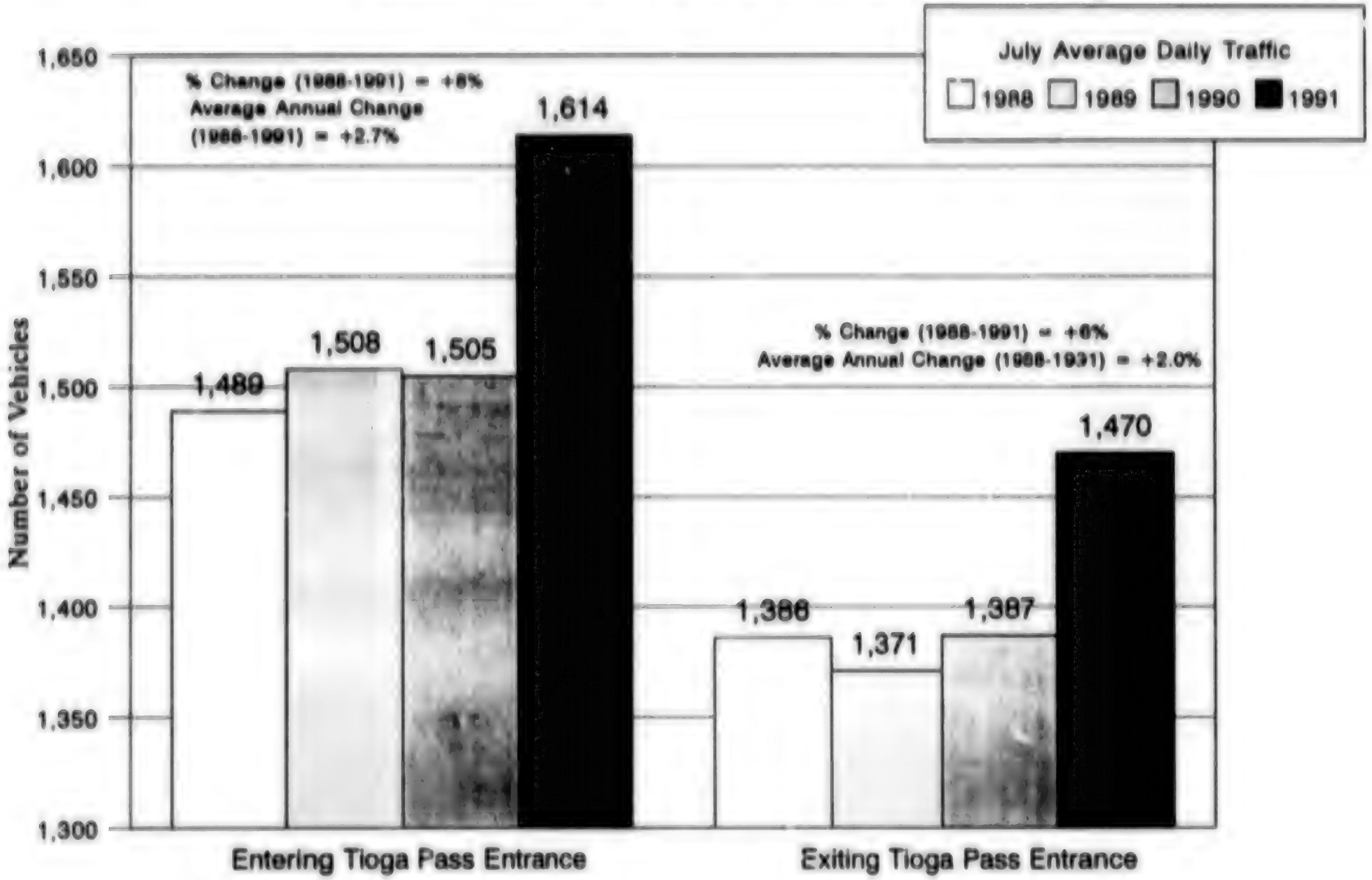
Traffic Counts Near the South Entrance



SOURCE: National Park Service Denver Service Center Branch of Transportation

Figure 9: Yosemite National Park

Traffic Counts at Tioga Pass Entrance



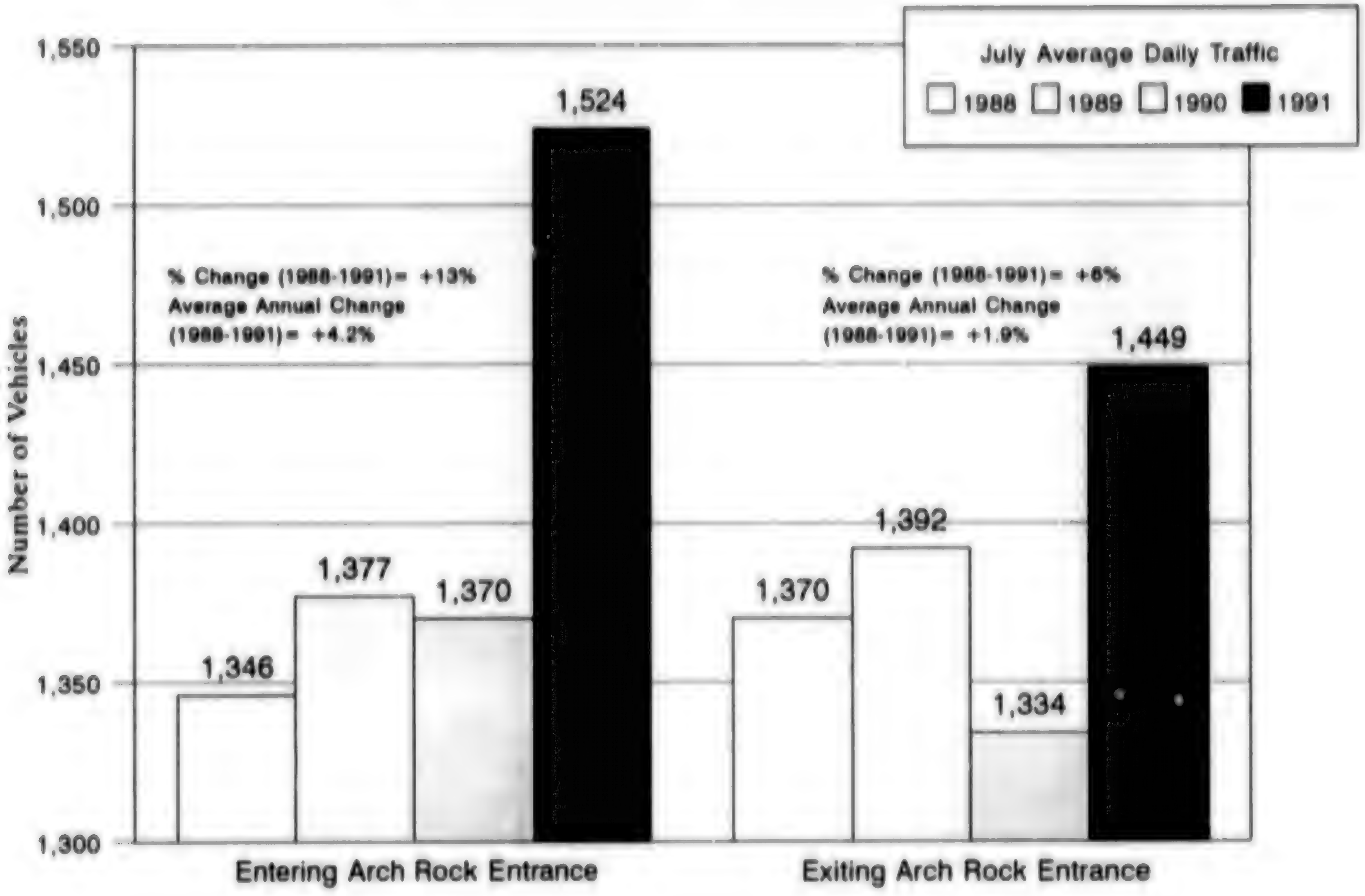
% Change (1988-1991) = +8%
Average Annual Change
(1988-1991) = +2.7%

% Change (1988-1991) = +6%
Average Annual Change (1988-1931) = +2.0%

SOURCE: National Park Service Denver Service Center Branch of Transportation

Figure 10: Yosemite National Park

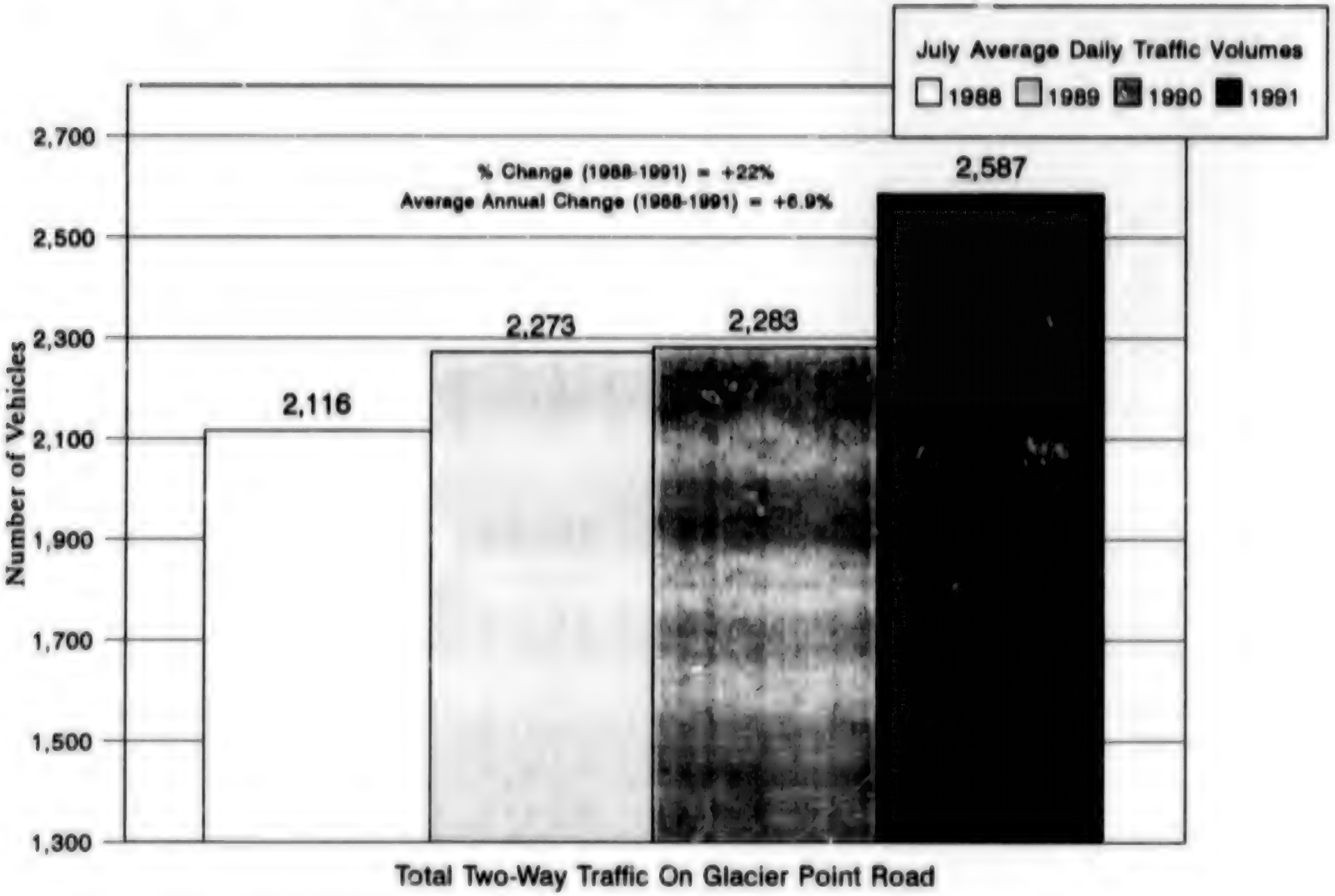
Traffic Counts at Arch Rock Entrance



SOURCE: National Park Service Denver Service Center Branch of Transportation

Figure 11: Yosemite National Park

Traffic Counts on Glacier Point Road



SOURCE: National Park Service Denver Service Center Branch of Transportation

Congress has set aside 677,000 acres or 94% of the park as wilderness. The wilderness boundary is typically 200 feet on either side of the centerline of public access roads and 100 feet from the centerline of roads restricted from visitor use. An act of Congress is required to change the wilderness boundary.

Geologic Resources

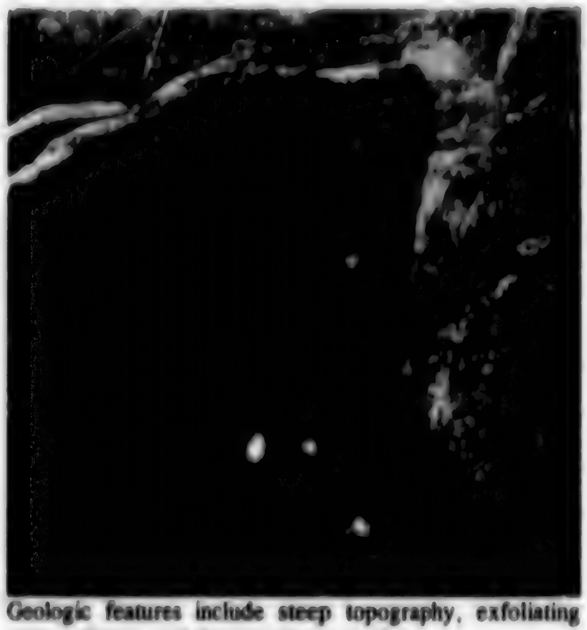
The park ranges in altitude from 2,127 feet at the west entrance to Yosemite Valley to 13,114 feet at Mt. Lyell in the Cathedral Peaks on the east side of the park. Glaciers shaped Yosemite more than any other force; the forms created by the eroding ice reflect the peculiar strength and the unusually massive internal structure of the rocks in the park.

Where hard and massive, the rocks withstood erosion and now stand as sheer cliffs or domes, but where weaker, and more cracked, valley walls are now recessed and valley bottoms widened out and deepened to hold lakes or meadows.

Higher in the park, later glacial advances left the high Sierra dotted with lakes, marked with domes, and laced with young mountain streams. Some of the lakes have been filled in with sediment and are now meadows or forested flats.

The granite geologic substrate withstood glacial erosion and now stands as sheer cliffs or domes. Significant geologic features include steep topography, exfoliating rock surfaces, decomposing granite, highly eroded soils, and unstable glacial deposits in narrow canyons.

Combined with the sierran ecology of natural fires and major flood events, there exist serious geologic hazards to human safety along park roads - in Yosemite Valley in particular. Floodplains, rockfall zones, and debris and mud flow hazards are now being mapped. There are no active faults in the park.



Geologic features include steep topography, exfoliating rock surfaces, and decomposing granite.

Planning for future transportation projects might involve realignment of roads and relocation of overnight lodging and campgrounds, and picnicking areas to avoid geologic hazard areas.

Soils

Soils are derived primarily from the underlying granite bedrock. Some limitations to use are associated with soils in frequently flooded areas, locations with poor drainage and on severe slopes where there are shallow soils. Some localized soils contain hazardous materials from past activities, including residual mine tailings, leaks from underground storage tanks, historic park dumps and land fills, contaminants from storm drain outfalls, and improper human and stock waste disposal. Cleanup has occurred at only a few of these sites.

Air Quality

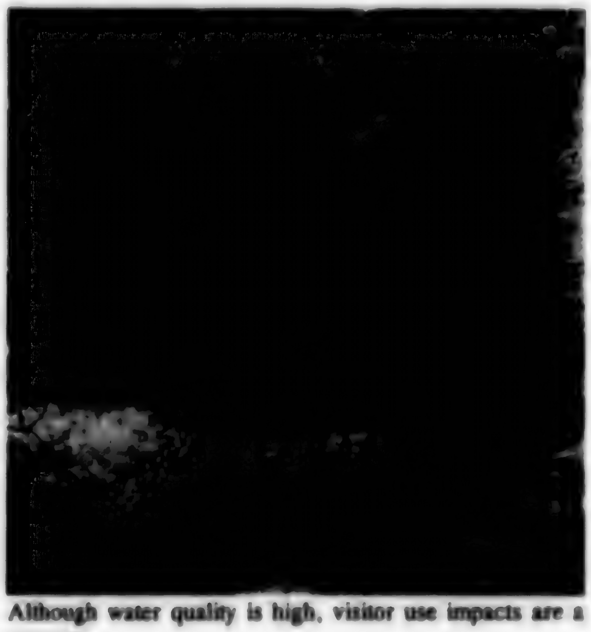
Yosemite National Park is designated as a Class I area under the Clean Air Act. This designation provides the highest level of air quality protection under Prevention of Significant Deterioration (PSD) regulations.

Air pollutants in the park originate primarily from populated areas outside the park, such as the San Joaquin Valley and San Francisco Bay area. Airborne fine particulates from these areas significantly reduce summertime visibility in the park. Serious visibility impairment from human sources outside and inside the park occurs in the park on 90% of the summer days.

Particulate matter is transported into the park from the surrounding area and is also generated within the park. Federal and state air quality standards for particulate matter are sometimes exceeded in the park. These exceedances primarily occur because of fireplaces, campfires, and wild or prescribed fires.

Visible ozone injury has been found on 29% of the ponderosa and Jeffrey pine surveyed in the park. The levels of ozone measured in Yosemite are due to pollution transported from the populated and industrial regions west of the park.

The entire Sierra Nevada range has been designated as a region sensitive to acid precipitation due its granitic substrate and the low buffering capacity of its lakes and lake basins. Within the park, seasonal acidification occurs during spring snow melt and late summer rain storms. The result of this acid pulse on aquatic resources is a concern.



Although water quality is high, visitor use impacts are a concern.

Water Resources

Although water quality within Yosemite is generally above state and federal standards, there are concerns over the amount of visitor use and the subsequent impacts on water quality. Compliance with both state and federal standards is mandatory. Given the amount of vehicular use within the park, contamination of surface water resources may potentially come from various pollutant sources, such as non-point source releases of roadway hydrocarbons via runoff or accidental spills.

Additionally, many visitor activities that focus on water use pose threats to water quality. These uses include rafting, swimming, and camping sanitation. Surface discharge from contaminated ground water and from domestic sewage treatment systems located in the valley and Wawona are also of concern. Droughts and associated low water conditions create the potential for concentration of contaminants.

A history of removing fallen trees from streams and rivers for visitor safety and bridge protection has resulted in altered river dynamics and aquatic and riparian ecosystems that have varied from natural conditions. A recent change in park policy will leave fallen trees in the river.

Manmade water diversions and extractions from surface waters, combined with continuing drought conditions, have increased concerns over the potential for adverse effects to aquatic ecosystems at several locations throughout the park. Water diversions and extractions have provided water for domestic potable uses, fire suppression, and suppression of fugitive dust on secondary roads.

Approximately 71 miles of the Merced River have been placed under the protection of the Wild and Scenic Rivers Act. An interim boundary for protection of the river corridor has been set at .25 mile on either side of the river, except in Yosemite Valley, where the interim boundary is either .25 mile or the valley wall, whichever is narrower.

Ground water resources also provide a portion of domestic water supplies throughout the park. Protection of ground water will be an important component to future transportation improvements.

Vegetation

Major vegetation zones in the park are chaparral, mixed conifer, red fir, lodgepole pine/subalpine, and alpine. Meadows are considered to be distinct zones and can occur in any of the vegetation zones. Park roads cross all but the alpine zone. The zones vary in sensitivity to use, disturbance, and recovery time. Sensitivity is affected by the length of the growing season, soil type and depth, moisture availability, and disease resistance. In general, the higher the elevation, the greater the habitat sensitivity.

The lodgepole pine subalpine zone is the most extensive vegetation habitat (40% of total area) in the park. The red fir and lodgepole pine subalpine zones are more sensitive to disturbance than lower elevations due to their fragile meadows, short growing seasons, and thin soils.

The mixed-conifer forest zone is dominated by ponderosa pine, sugar pine, incense cedar, Douglas fir and white fir. Black oak occurs at lower elevations in this zone. In general, the mixed conifer zone is less sensitive to disturbance than zones of higher or lower elevations due to a relatively long growing season and well-developed soils. Most of the major activity areas of the park are in this zone. California black oak is a significant component of the mixed conifer zone, providing habitat and food for a variety of wildlife species and a backdrop for many historic and scenic views. The oaks have been significantly impacted by past management practices such as fire suppression. High visitor use levels also have led to permanent loss of some of this critical natural habitat.

Meadows are more sensitive to disturbance than forested areas.

Meadows are generally more sensitive to disturbance than forested areas of the same elevation. They are sensitive to trampling and soil compaction, which can cause major changes in plant species content in early spring. The meadows become less sensitive as they dry out. Subalpine meadows are more sensitive than those at lower elevations because of the short subalpine growing season. This makes natural and assisted revegetation of disturbed areas difficult. It is park policy to avoid any new disturbance to meadows and to restore disturbed meadow areas where possible.

Low elevation meadows are primarily composed of grasses and sedges, with sedges dominating the wetter sites. Species composition in many of these meadows has been radically altered with the introduction of dominant nonnative grass species. Fragile riparian vegetation along stream banks, wetlands, and the shores of lakes and other bodies of water are extremely critical to the health and species diversity of park ecosystems. Currently, road alignments surround or encroach upon most of the meadows. The roads provide visitor access to these fragile wetland habitats and accelerate their disturbance.

The giant sequoias of Yosemite are a significant resource. They are listed as one of the resources that make Yosemite a World Heritage Site. The three giant sequoia groves at Merced, Tuolumne, and Mariposa are in isolated pockets within the mixed conifer zone. Human-caused impacts in the giant sequoia groves include soil compaction, root pruning, erosion, disruption of natural drainage patterns, vandalism, and injury caused by climbing, and introduction of root rots and exotic plants.

The park contains three federal Category 2 candidate species (wooly sunflower, Bolander's clover and Hetch Hetchy monkey flower). The wooly sunflower only occurs in the park and in the adjacent Stanislaus National Forest, growing in isolated groups on granite slabs and domes in upper mixed conifer forests. The clover is found in isolated locations within wet mountain meadows.

Four additional species are listed as rare by the state of California. In addition, 83 species in the park are on the California Native Plant Society list for sensitive species due to their limited distribution or potential for future habitat disturbance from human activities.

The continued presence and further spread of nonnative plant species in Yosemite is causing irreversible ecological and scenic change. The problem is compounded over time with exotic plant species invading the park and crowding out native species. As percentages of noxious species increase, wildlife habitat and natural resource values continue to be lost. Bull thistle, wooly mullein, and Klamath weed have been identified as noxious plants in Yosemite since the 1940s.

Wildlife

Based upon ecosystem dynamics, maintenance of healthy vegetative habitats is necessary to sustain natural wildlife populations. Past management practices and human influences have modified plant species composition within native plant communities and have fragmented wildlife habitats. This has resulted in isolation of wildlife populations with deleterious effects on genetic diversity and viability. Wildlife habitat impacts are exemplified by the park's growing list of sensitive animal species.

Approximately 50 threatened, endangered, and sensitive animal species are found in Yosemite. These include amphibians, reptiles, birds, mammals, fish, and invertebrates. Management is guided by park, state and national directives to maintain a maximum of species and genetic diversity.

In addition, many of these species often use habitats outside of park boundaries, where land management practices and other human influences can adversely affect their populations. Human influences within the park must also be closely monitored and impacts mitigated. Two species occurring in the park are listed as endangered by the U.S. Fish and Wildlife Service — the American peregrine falcon and the southern bald eagle.

The peregrine falcon is present in small numbers in Yosemite National Park. In 1990 there were four peregrine falcon nest sites in Yosemite. Management of this species in the park is aimed at restoration of a natural population by protecting and enhancing reproduction.

Bald eagles winter in small numbers on Cherry Lake, Lake Eleanor, and Hetch Hetchy Reservoir where they subsist primarily on fish. The Endangered Species Act mandates a formal consultation with the Fish and Wildlife Service whenever federally approved actions could affect an endangered species.

The great gray owl is listed by the state of California as an endangered species. Its known range in the state is restricted to the Yosemite National Park region. It is the rarest owl in California and one of the three rarest birds in the state. Because of the potential sensitivity of the owls to human pressure, significant disturbance from visitor activity and management activity in owl habitat need to be minimized.

The California spotted owl is federally classified as a Category 2 candidate species for the endangered list. The state recognizes the owl as a species of special concern. In the Yosemite area, California spotted owls are most numerous at elevations ranging from 4,250 to 7,250 feet in stands of mixed conifer forest, although they also occur at lower and higher elevations. Some owls are permanent residents of the mixed conifer forest, while some migrate to lower elevations during the winter. Areas of use within the park include Big Meadow near Foresta, Happy Isles in Yosemite Valley and Indian Creek near El Portal. Studies in the Sierra and Giant Sequoia National Forests in the San Joaquin and Kings River watersheds have documented year-round use as well as breeding in low elevation, oak-woodland habitat type.

Neither the great gray owl nor the spotted owl stay all year in protected habitats within the park. They both use areas at lower elevations in the winter and early spring. Recognition and protection of these significant areas are fundamental to protecting both species and to allowing species recovery through expansion beyond the present restricted ranges.

Known nesting sites in the park for both owls, range in elevation from about 4,200 feet to 7,400 feet. They are located within the mixed conifer forest type dominated by ponderosa pine, incense-cedar and black oak at the lower elevations, and red fir and lodgepole pine at the higher elevations.

Intermediate or transitional meadows, such as those in the vicinity of Crane Flat, Glacier Point and Ackerson Meadow, play a significant role in the survival and reproductive success of the great grey owl population. They provide winter forage areas when the higher summer range, including breeding/nesting meadows, is snow covered. In addition, they serve as staging areas during late winter and early spring. These meadows also serve as staging areas for non-breeding birds when breeding/nesting meadows are occupied by breeding pairs and higher elevation meadows are still snowbound. These meadows also provide snow-free hunting areas for breeding males that move downslope because snow conditions, such as spring snow storms, temporarily prohibit hunting in the breeding meadows.

The Swainson's hawk, Sierra Nevada red fox, wolverine, and California bighorn sheep (which was recently reintroduced into Yosemite) are listed as threatened in California. Two species, the mountain beaver and the fisher, are considered rare in the park.

Category 2 candidate amphibian species found in Yosemite include the California red-legged frog, limestone salamander, foothill yellow-legged frog, mountain yellow-legged frog, and Yosemite toad. Wetlands and soil resources are critical to these species.

Cultural Resources

Yosemite's cultural resources document a long record of human presence, in the park spanning the past 3,200 years. Although less than 5% of the park's total area has been surveyed for cultural resources, more than 800 cultural sites have been located and documented. It is estimated that there are at least 1,500 additional cultural sites in the remaining 95% of the park.

Yosemite's cultural resources include not only the remains of prehistoric villages, campsites, resource procurement areas, artifact caches, and cemeteries, but also the cultural, sacred heritage sites and traditions of the Yosemite Miwok Indians. In addition, there are historic sites and structures (including trails, roads, and bridges), historic views and landscapes, and cultural objects and associated records — such as ancient and historic artifacts, native American basketry, artwork, historic period furnishings, photographs, and library collections.

A total of twelve prehistoric archaeological districts (including several hundred individual sites) have been listed, or determined eligible for listing, on the National Register of Historic Places. A total of 144 structures are on the List of Classified Structures, 24 historic structures or features are listed on the national register and three are determined eligible for listing, and three historic structures have been listed as national landmarks. Hundreds of sites, features, and structures have yet to be evaluated for significance.

Some of the park's historic structures have fallen into a progressive state of disrepair. Stabilizing these resources is important.

Visual Resources

Views of the spectacular natural setting are considered the single most important reason people visit Yosemite. Particularly significant view corridors include the Arch Rock entrance and Wawona Roads for views of the Merced River and Yosemite Valley.

Three viewpoints are particularly spectacular — Glacier Point at an elevation of 7,200 feet, an overlook about 1/2 mile up the Yosemite Falls trail at an elevation of 5,000 feet, and Discovery View at the east end of the Wawona tunnel. All provide spectacular views of Yosemite Valley.

MARIPOSA GROVE EXISTING CONDITIONS

Currently, access to Mariposa Grove is provided by the Mariposa Grove access road immediately north of the south entrance station. The access road is in fair to poor condition, and is substandard based on its current use as defined by NPS Park Road Standards (9-foot-wide travel lanes with shoulders varying from 0 to 1 foot). The existing car and bus parking areas (120 car spaces and 6 bus spaces) are located in the center of the lower grove, which significantly restricts giant sequoia seedling establishment and make resource management difficult. The Mariposa Grove and Wawona area are illustrated on the map on the following page.

A 6.8-mile loop road, closed to visitor vehicles, winds through the grove. The park concession operates open-air trams along the road. NPS facilities in the tram staging area include a comfort station and an information kiosk. Along the tram loop, the Park Service maintains a comfort station and Mariposa Grove Museum. When such developments are located in a giant sequoia grove, protection of the prime resource is difficult.

Ongoing effects to the trees in the grove and the alteration of key environmental conditions necessary for the vigor and regeneration of the species include: injuries from the construction of roads, buildings, and parking; cut and exposed tree roots; compacted soils; accelerated surface runoff, soil loss, and an altered soil moisture regime. Heavy vehicular and foot traffic can damage the shallow feeder roots of giant sequoias, which are essential to survival. Removal of these facilities from the grove and enhancing the visitor experience are important objectives of the general management plan.

Visitation

The visitor use levels at Mariposa Grove are rapidly approaching the use limits established in the general management plan (3,850 visitors per day). If visitation continues to increase, it may be necessary to impose a reservation system on use of Mariposa Grove. There is no overnight use of the area and none is proposed.

Visitation to Mariposa Grove peaks in July and August. Typically, the number of visitors in the grove peaks between noon and 2:00 p.m. As surveyed in August 1992, the maximum number of visitors in the grove occurred at noon, when 540 people were counted. The average length of stay of visitors is approximately 80 minutes.

Visitors may tour Mariposa Grove on foot or via open air trams.

Visitors to the grove arrive by tour bus from outside the region, by the major park concessioner tours, by shuttle bus from Wawona, or by private vehicle. The characteristics of the visit vary by mode of access.

Tour Bus. Approximately 15% of visitors to the grove arrive by tour bus. On an average day, up to 20 buses enter the grove. During the peak visitation times, as many as 30 buses per day may enter. There are typically between 30 and 50 passengers per bus. The estimated average length of stay of tour bus visitors is about 60 minutes. A high proportion of elderly visitors and groups are included in tour groups. The majority of tour bus trips are through-park trips with most arriving at the grove on the last portion of a southbound trip before exiting the park.

A varying number of tour buses originating inside the park also visit the Mariposa Grove each day. The Big Trees and Grand Loop tours offered by the park concessioner typically account for one to five bus trips into the grove per day. Passenger occupancies on the tours vary substantially based on demand.

Wawona Shuttle. A free shuttle bus system to the grove has been implemented from remote parking and lodging locations in the Wawona district. The demand for this service is generated by the overcrowding of the parking lot within the grove. When the grove parking lot fills to capacity, traffic is diverted to Wawona and shuttle access is provided.

The shuttle operating season was originally between Memorial Day and Labor Day, but has been extended into the shoulder seasons due to high demand. Daily service begins at approximately 10:00 a.m., with the last shuttle leaving the grove at 6:00 p.m. The present route is just over 7 miles long and takes an average of 20 minutes to travel in one direction. The three remote locations served by the shuttle include the Wawona campground, Wawona store, and a small parking area at the south entrance. Buses drop passengers off in an area containing tour bus stalls adjacent to the main parking lot at Mariposa Grove.

The Wawona store parking lot serves as the primary parking location for shuttle bus riders. The parking area is also shared by store customers and visitors to the adjacent Pioneer History Center. No fixed schedule has been established for the shuttle buses, but the intent is to provide service at half-hour intervals. Service at the Wawona campground is provided intermittently due to uncertain passenger demand.

Shuttle service is provided by over-the-road buses with a capacity of 49 seats. A fleet of four buses is used during peak days.

Approximately 40% of the daily visitors to the grove arrive by the Wawona shuttle. On the peak visitation days, shuttle riders may be more than 50% of the daily visitors. Ridership has soared dramatically since the system was inaugurated in 1988. Annual ridership has increased by an average annual rate of 71% over the past four years, as shown in figure 12. The operating budget of $68,939 in 1992 translates to an average cost per rider of $0.35. The average estimated stay in the grove by shuttle visitors is 70 minutes.

Private Vehicles. More than 40% of visitors to the grove arrive by private vehicle. Of these, a majority (45%) enter the park at the south entrance station and proceed directly to the grove; approximately 30% arrive from the north and return northbound when their visit to the grove is complete; 20% leave the park (southbound) after they visit the grove; and 5% enter the park from the south and return southbound when their visit to the grove is complete. The estimated average length of stay in the grove for private vehicle visitors is 80 minutes. Average occupancy is 2.9 visitors per vehicle.

Once at the grove, all visitors may take open air trams that depart from a boarding area adjacent to the private vehicle and tour bus parking lot. The trams depart every 15 minutes for a one-hour tour through the giant sequoias. Tours operate daily from 9:00 am to 5:00 pm. Tram drivers provide interpretation of the history and evolution of the grove, and passengers are encouraged to leave the tram to explore the grove on foot if they desire. The trams run from

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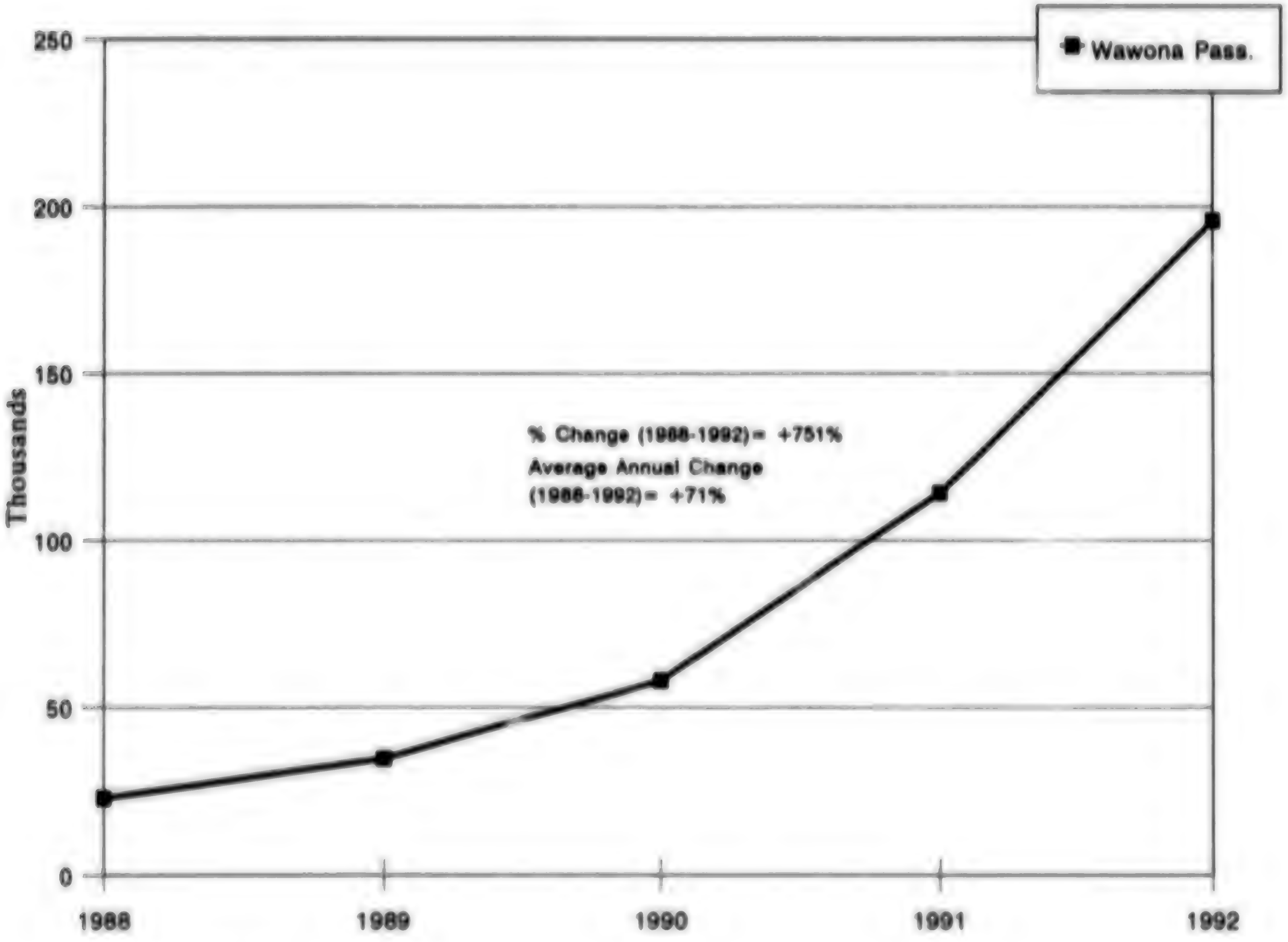
Figure 12: Yosemite National Park

Wawona Shuttle Bus Passenger Counts



SOURCE: Yosemite staff
NOTE: Wawona service began in 1988

May through October. Many visitors choose to walk through the grove, rather than taking the tram tour.

Parking Facilities

The primary visitor parking areas in the vicinity of Mariposa Grove are located directly at the grove, near the south entrance station (two small lots), and at Wawona (associated with the shuttle bus operation).

Mariposa Grove. Includes 120 auto parking spaces and 6 bus parking stalls. This paved and striped lot within the Mariposa Grove provides short-term parking for viewing the giant sequoia trees. The parking area provides good circulation with a single loop layout. Parking space occupancy is monitored on a regular basis to determine when the lot has reached capacity. Vehicles are diverted at the access road entrance near the south entrance station when the lot is full. Shuttle and tour buses use designated parking stalls in an area directly adjacent to the grove concession operations.

South Entrance North Lot. Includes 17 parking spaces. This small paved and striped lot typically serves as one of the Wawona Shuttle staging areas. Visitors who are diverted from the grove when parking restrictions are in effect will often attempt to park here and use the shuttle. The lot is usually full and can become very congested during busy periods.

South Entrance South Lot. Includes 9 parking spaces. Visitors often stop at this location to orient themselves and use nearby restrooms after entering the park. During grove road closures, visitors will park here and assess their options for access. The lot is paved and striped and is directly adjacent to the south entrance station.

Wawona Hotel Main Lot. Includes 51 parking spaces. Hotel guests, golfers, and other park visitors use this paved and striped parking area. Circulation is efficient through a loop driveway directly in front of the hotel. Two additional areas are available for hotel visitors on the north side of the facility: a gravel surface lot adjacent to the tennis courts (18 parking spaces), and a combination gravel and paved lot (32 parking spaces) north of the hotel.

Wawona Store/Pioneer History Center. The area includes 87 parking spaces. The paved and striped parking area at the store is the busiest parking lot in the Wawona area. The lot serves as the primary passenger staging area for the Wawona Shuttle to Mariposa Grove. Most of the visitors diverted from the grove during parking closures will attempt to board the shuttle at this lot. Store customers and Pioneer History Center visitors compete with shuttle users for available parking spaces. A short to midterm length of stay in this lot typically coincides with average visit times to the grove.

Strip Parking Across California Highway 41 from Wawona Store. Includes 60 parking spaces for recreational vehicles and overflow. After the Wawona Store lot fills to capacity, vehicles are diverted across California Highway 41 to a gravel area adjacent to the road for parking. This is also the recommended location for recreational vehicle parking, due to size limitations in the store lot. Use of this area can create hazards as vehicles turn into the spaces directly from the main road and pedestrians cross the road to the shuttle boarding area in the store lot.

The Wawona Store parking lot also serves as the primary staging area for the Wawona shuttle.

Parking Occupancy and Turnover

Parking use inventories were conducted at the major public parking areas in the

Mariposa/Wawona area on Friday, August 28, 1992. Although this was not a peak visitation day, the results provide an insight into the variation of parking demand over the day and give an indication of the most popular parking locations in the area.

Of the 406 total automobile parking spaces available for grove visitors in the Mariposa/Wawona area, the average occupancy was 44% on August 28th. However, on this day, parking demand increased to 77% of supply, as shown on figure 13.

Mariposa Grove. The most heavily used lot is located at the grove. Average occupancy of this lot is 83% with maximum use at 100%.

On peak visitation days, this lot may be closed many times during heaviest demand periods. Full use of the grove lot, and the need to close the grove access road, continued into the fall season in 1992. The closing of the grove parking lot and access road complicates vehicular movement at the south entrance.

The grove road is closed when the parking lot is full.

Wawona Store. Average occupancy of this lot is 80% with a maximum peak use of 100%. Some confusion results from lack of schedule information for the shuttle, conflicts among the various users of the parking lot, and undefined queuing and boarding areas for the shuttle.

Wawona Hotel. The various lots around the hotel average approximately 80% occupancy with maximum peak use of approximately 98% (main parking lot) to 88% (side lots).

Other Lots. The remaining small lots are heavily used, particularly the two south entrance lots because of their proximity to the grove. The strip parking area across California Highway 41 at the Wawona store serves as an overflow lot and is not heavily used except on the busiest holiday weekends in the summer.

Figures 14 and 15 show parking durations at the lots primarily used for grove access. Figure 16 shows a record of vehicle and bus passenger entries and exits at the grove lot over a three-hour period.

The six tour bus spaces in the grove parking area are usually adequate to serve the tour buses entering the grove, even during peak periods. On the busiest days, up to twelve buses have been parked at one time.

Traffic Conditions

Two lanes approach the tee intersection at the south entrance. Left turns from the south to Wawona and Yosemite Valley are made from either lane after vehicles pass through the entrance station. Right turns to Mariposa Grove are also made from either northbound lane, leading to conflicts and safety hazards.

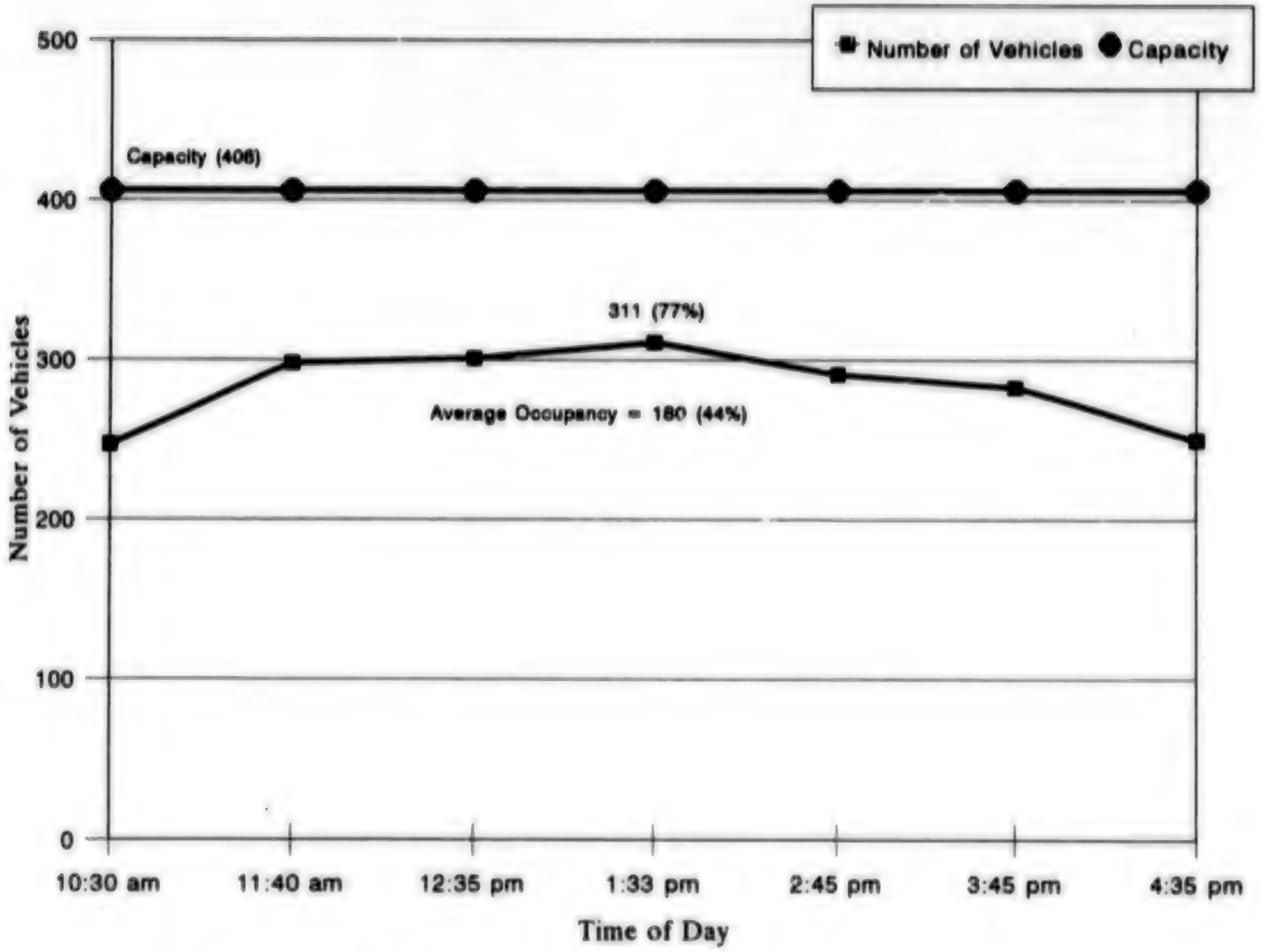
Vehicles headed to the Grove from the south traverse the tee intersection, crossing the path of entering vehicles.

The functional layout of the area is shown in figure 17.

The south entrance is the busiest entrance to the park; traffic has been increasing at an average annual rate of 4.5%.

Wawona Road at the south entrance is generally in good condition, but poor sight distances, steep grades, and recurring traffic congestion exist at and near the Mariposa Grove road intersection. This park entrance was designed and installed over 50 years ago when traffic volumes and park

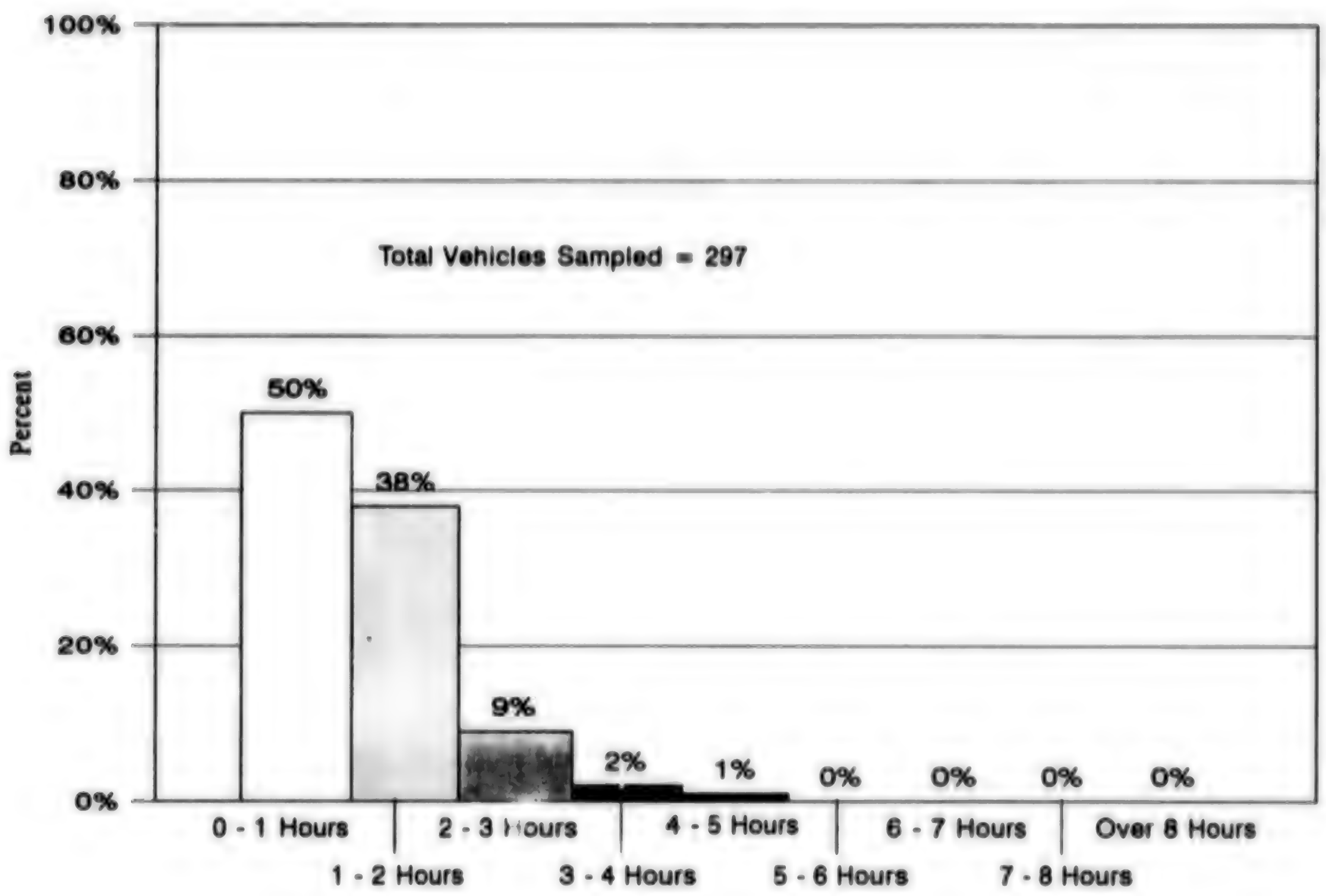
Figure 13: Yosemite National Park
Wawona and Mariposa Grove Parking Occupancy Summary



SOURCE: BRW field survey, August 28, 1992

Figure 14: Yosemite National Park

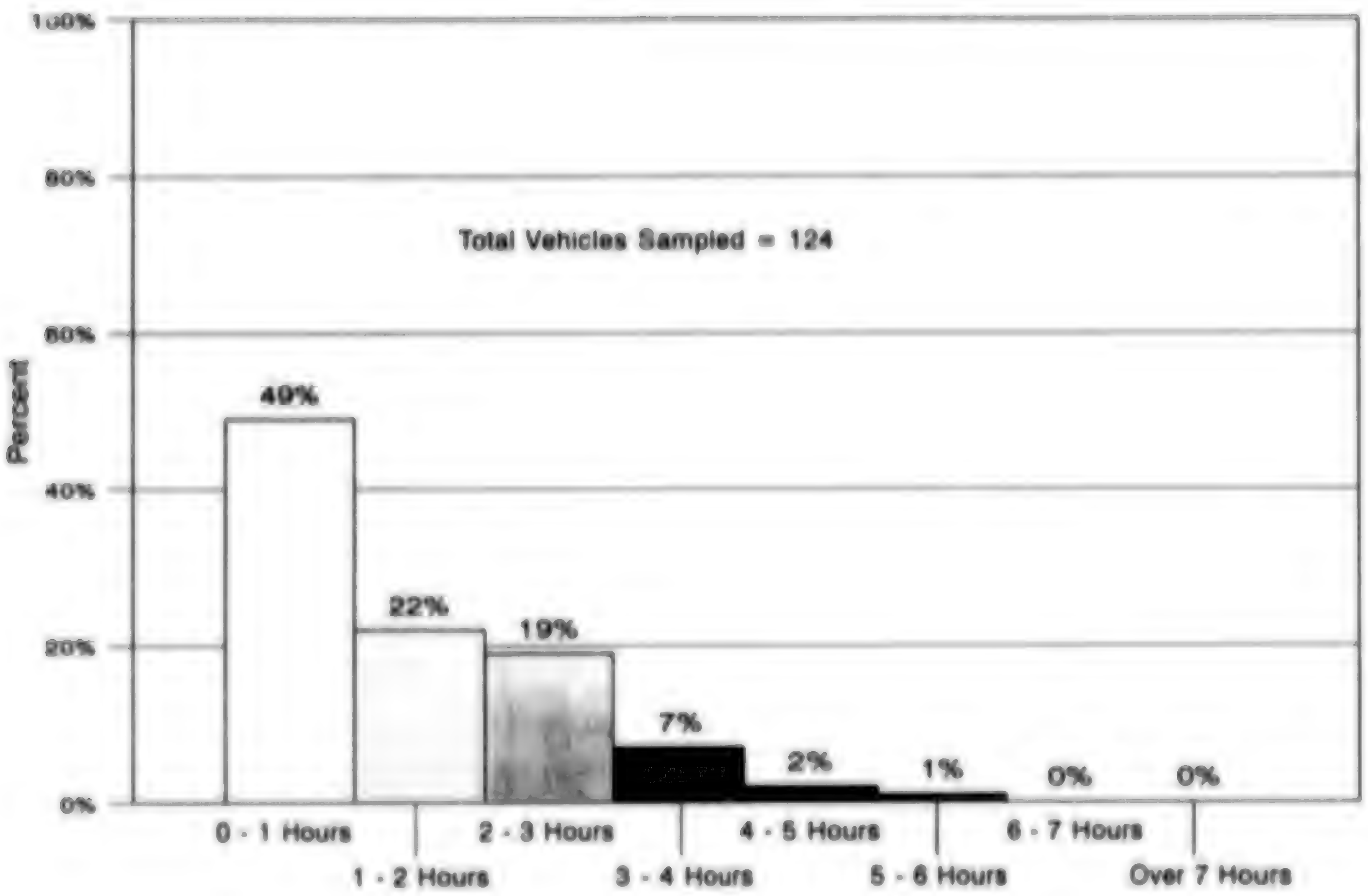
Mariposa Grove Parking Durations



SOURCE: BRW field survey, August 29, 1992

Figure 15: Yosemite National Park

Wawona Store Parking Durations



SOURCE: BRW field survey, August 28, 1992

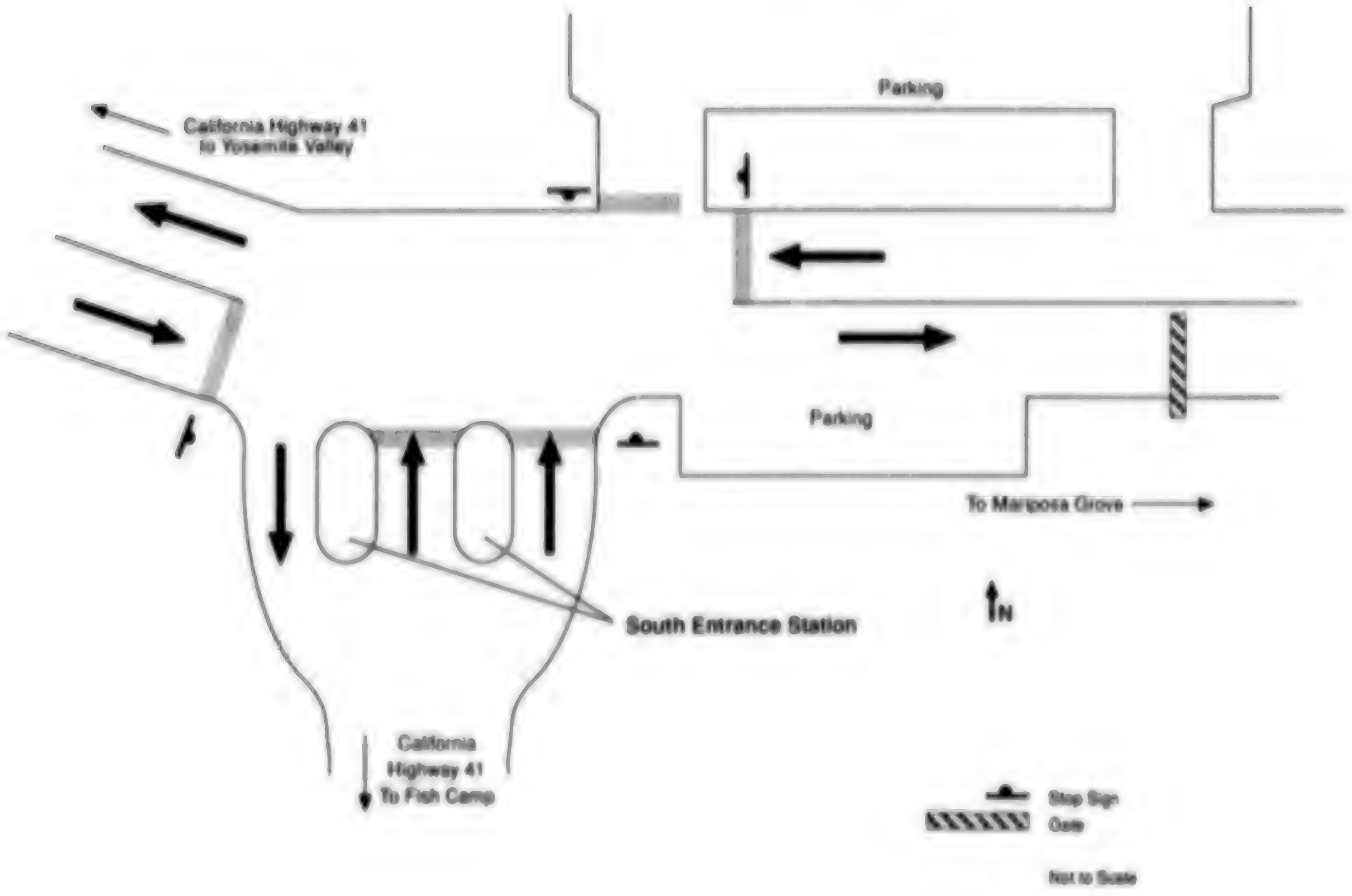
Figure 16: Yosemite National Park

Mariposa Grove Activity Detail

	Private Vehicles			Tour Buses			Shuttle Passengers		
Time	In	Out	Total Parked	In	Out	Total Parked	In	Out	Total in Grove
8:46			18			0			0
8:46-9:00	14	6	26	0	0	0	0	0	0
9:01-9:15	13	5	34	0	0	0	0	0	0
9:16-9:30	18	6	46	1	0	1	7	0	7
9:31-9:45	20	5	61	1	0	2	0	0	7
9:46-10:00	28	14	75	0	0	2	0	0	7
10:01-10:15	24	9	90	0	2	0	0	0	7
10:16-10:30	23	10	103	0	0	0	11	0	18
10:31-10:45	25	15	113	0	0	0	15	0	33
10:46-11:00	11	10	114	1	0	1	8	0	41
11:01-11:15	0	7	107	0	0	1	51	4	88
11:16-11:30	0	5	102	0	0	1	43	0	131
11:31-11:45	0	23	79	0	0	1	55	4	182
11:46-12:00	6	21	64	0	0	1	119	18	283
Additional Shuttles On Road:							42	0	325

SOURCE: BRW Field Survey, 08/29/92

Figure 17: Yosemite National Park
South Entrance Intersection Configuration



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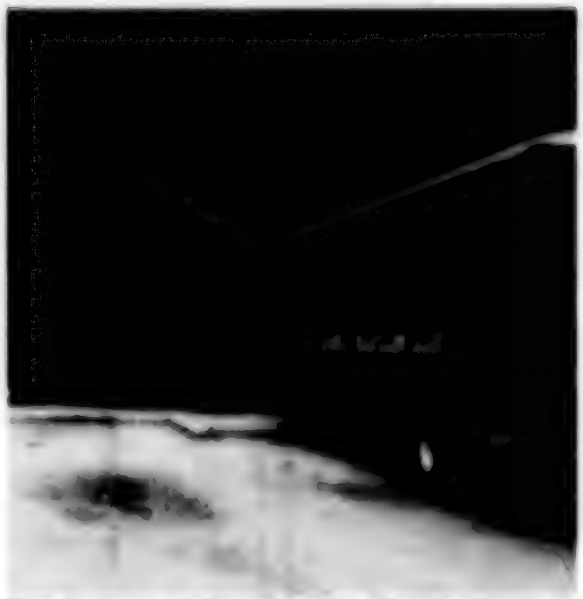


Tour buses use designated parking directly adjacent to grove concessions.

visitation was low. Increases in visitation and traffic volumes have resulted in inadequate vehicle queuing space and frequent traffic conflicts in the intersection.

Also, in the immediate vicinity of the intersection are a comfort station, entrance kiosk, two small parking lots (17 and 9 spaces), ranger station, and ranger's residence. Vehicle movements to and from these facilities create conflicts with the major movements in the intersection.

During peak visitation, traffic volumes into the intersection from each direction are about equal, with slightly more northbound traffic. The predominant movement of traffic through the intersection is to the northwest (46%) towards Wawona and Yosemite Valley, 29% southbound, and the remainder (25%) eastbound toward the grove, as shown in figure 18.

The intersection is confusing for several reasons.

- At the south entrance station, many park visitors not only pay their entry fee, but also stop to ask questions concerning park activities and facilities. This delay, multiplied by the numbers of visitors with similar questions, results in serious traffic delays. The leisurely park experience can be disrupted even before entering the park.

- The proximity of the south entrance station to the intersection causes frequent conflicting movements. There is no opportunity for sorting of traffic by purpose or destination prior to entering the intersection. First-time users can easily be disoriented.

- Visitors are not informed that the grove parking lot is closed, prior to turning onto the grove access road. When they encounter the gate across the road, they must turn around. Most of the diverted traffic passes through the congested tee intersection again, causing further conflict and delay.

Management Issues

There are two major management issues at Mariposa Grove:

- Resource management and protection at the grove. The giant sequoia trees are being damaged; environmental conditions necessary for the vigor and regeneration of the species have been altered. Unnecessary facilities must be removed and detrimental visitor practices must be stopped.

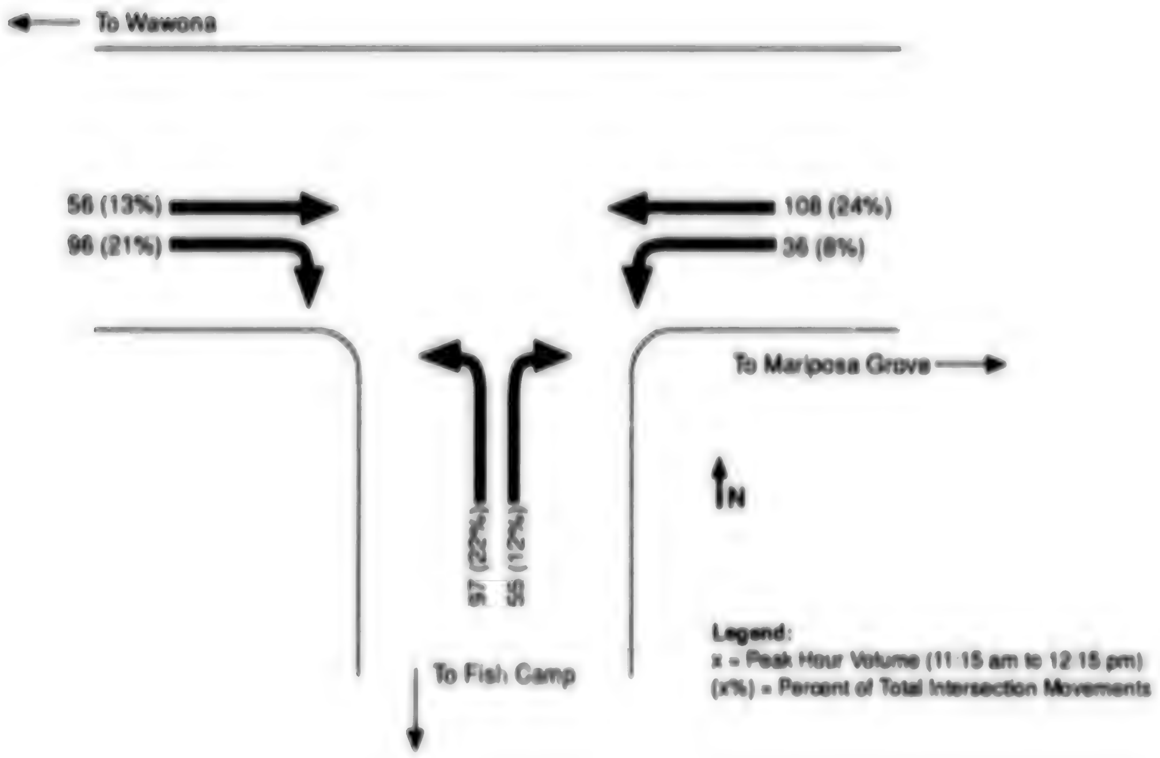
- Safety improvements must be made at the south entrance station and the intersection of California Highway 41 with the Mariposa access road. Confusion should be reduced. Better informational systems are needed to direct visitors to other park attractions or to the Wawona Shuttle when the grove parking area is full.

Resource Issues

The following are the most important resource issues associated with visitor use and transportation in the Wawona/Mariposa Grove area. The attached map illustrates the most significant resource areas in the area.

Geology/Topography. Three stages of mountain glaciation significantly altered the character of many of the stream-formed canyons within the park. The effects of these glacial periods are not pronounced in Mariposa Grove, but geologic uplift is evident throughout the area.

Figure 18: Yosemite National Park
South Entrance Intersection Turning Movements



Legend:
x = Peak Hour Volume (11:15 am to 12:15 pm)
(x%) = Percent of Total Intersection Movements

Conducted August 29, 1992, 11:00 am to 1:45 pm (Grove road was closed from 11:17 am to 12:24 pm)

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The topography of the area varies from level to moderately steep. The south entrance elevation is approximately 5,100 feet and the roadway to the lower grove rises slightly along its 2-mile route to an elevation of approximately 5,800 feet at the grove. The tram loop and roadway to the upper grove is moderately steep. The elevation of Wawona Point, at the top of the road is approximately 6,800 feet.

Soils. Mariposa Grove soils are primarily residual or alluvial, slightly acidic, and developed over granitic bedrock. Residual soils are more abundant and consist of sand or silty loam with poor profile development. Alluvial soils contain more clay and are classified as silt loam, loam and sandy loam. The alluvial soils have deeper and better developed profiles than residual soils. This soil type generally presents slight to moderate limitations to construction of roads and structures.

Air Quality. As designated under the Clean Air Act, the air quality in Yosemite National Park is Class 1, indicating the lowest allowable increments of air quality degradation.

Air pollutants in the park primarily originate from populated areas outside the boundary. However, vehicular traffic on the south entrance road, the Mariposa Grove access road, and in visitor use areas contributes to local air quality problems. Vehicle emissions by themselves generally do not cause rural air pollution problems, but they are of concern in the park because of their incremental additions to other sources of pollution.

Vehicles using the Mariposa Grove access road include buses, recreational vehicles, trucks, and cars. The concessioner also operates a diesel-powered tram system within the grove to provide transportation from the lower to the upper grove. Prescribed fires in the upper grove also add carbon monoxide and particulate matter to the air, which temporarily degrades local air quality.

Mature giant sequoias have a high tolerance to ozone and other oxidants but giant sequoia seedlings are more sensitive.

Also of major concern are the aesthetic effects of particulate matter, odors, and noise of diesel engines. Particulate matter is generally very localized; however, the odor and noise problems are disturbing to visitors since they distract from the tranquility and natural setting of the grove.

Hydrology. The drainage shed of Mariposa Grove is small. Although the drainage area has not been precisely mapped, it is less than one square mile. The upper grove is drained by Rattlesnake Creek, which follows a course through the grove and then flows southward to the east of the middle and lower groves. The lower and middle groves are drained by an unnamed creek. Both creeks in Mariposa Grove are intermittent and drain into the Merced River.

Floodplains/Wetlands. The floodplains of the creeks in the area have not been mapped, but the drainage basins are small and far from developments, so a flood would not threaten structures. It is also unlikely that visitors would be threatened in the event of a flood because access would be closed to roads subject to flooding.

The meadow in the upper grove is considered a wetland as defined in Executive Order 11990, *Protection of Wetlands*. Before this meadow can be restored to natural conditions, formal consultation with the Fish and Wildlife Service and the U.S. Army Corps of Engineers must be completed.

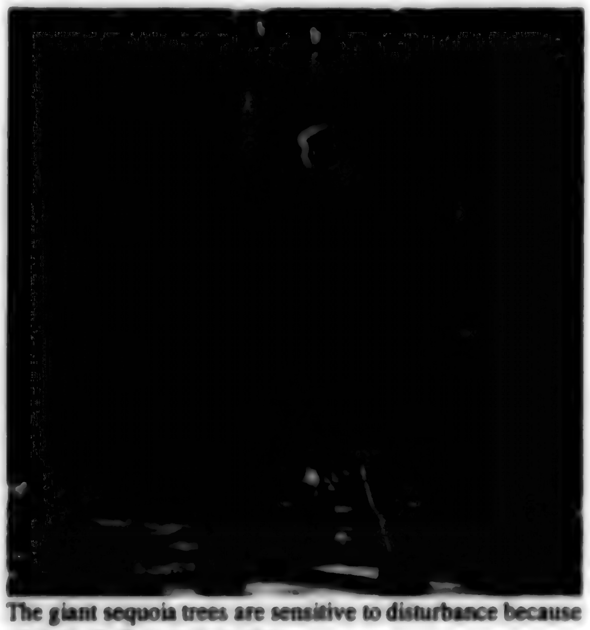
Vegetation. From the south entrance to Mariposa Grove the vegetation type is within the mixed conifer zone. This vegetation type is found between 3,000 and 7,000 feet. Mariposa Grove is also in this vegetation zone, but is termed mixed conifer with giant sequoias.

The dominant species in this zone include ponderosa pine, sugar pine, incense cedar, white fir, and Douglas fir. Giant sequoias are associated with the dominant species of the mixed conifer zone, but they are not characteristic of the conifer forest. Giant sequoias have been reduced substantially in range by climatic changes and remain as scattered relics of an earlier era. Some of them are perhaps only three generations removed from the last ice age. Of all the vegetation types, the giant sequoia are the greatest attraction to visitors.

Currently, Mariposa Grove seems to be a mature, steady-state grove. The present fire management of the upper grove appears to be encouraging regeneration, and this type of enhancement will continue.

In Mariposa Grove, direct injury from roadway construction is evident as roots are exposed along the road cuts. The soil moisture regime in Mariposa Grove has been affected by buildings, paved areas, and soil compaction from foot traffic.

Heavy foot traffic can also damage the shallow feeder roots that are essential to giant sequoia survival. The effects of foot traffic include the removal of inorganic material, soil compaction, and accelerated runoff from surface and drainage channel erosion. Surface soil losses in the grove are evident from exposed giant sequoia roots in heavily used areas.



The giant sequoia trees are sensitive to disturbance because of their shallow root system.

Wildlife. The most common wildlife within Mariposa Grove are mule deer, chickaree, Douglas ground squirrel, California ground squirrel, Stellar's jay, Oregon junco, and Audubon warbler.

Threatened, Endangered and Sensitive Plants and Animals. The giant sequoia is a sensitive species within the park and it is managed as such. There are no known endangered or threatened plant species in Mariposa Grove.

The only endangered mammal that may range in the Mariposa Grove area is the Sierra Nevada red fox. This species is not listed by the Fish and Wildlife Service, but it is listed as endangered by the State of California.

The endangered American peregrine falcon and the bald eagle are not known to permanently inhabit or nest in the Mariposa Grove area, but occasional flyovers are likely. Both these species are listed as endangered on the federal register and by the state of California.

Historical Resources. At the south entrance area there are three structures which have been nominated to the National Register of Historic Places. These structures include the ranger residence, the comfort station, and a small office building. In Mariposa Grove, the museum building has been listed on the national register, and the comfort station is being nominated.

Archeological Resources. Preliminary archeological surveys were conducted in the south entrance and Mariposa Grove areas in 1984. Six archeological sites were located in the vicinity of the south entrance, and five sites were within the grove. The Mariposa Grove archeological district was determined to be eligible for listing on the National Register of Historic Places in 1980.

TUOLUMNE MEADOWS EXISTING CONDITIONS

Tuolumne Meadows is the largest subalpine meadow in the Sierras. Tioga Road travels through a four-mile section of the meadow between Lembert Dome and Pothole Dome. At over 8,500 feet, the environment of this area is distinctly different from that of the rest of Yosemite. The Tuolumne River runs through the meadow on its route to the Grand Canyon of the Tuolumne and Hetch Hetchy reservoir. The Tuolumne Meadows area and the adjacent sections of the Tioga Road are illustrated on the map on page 72.

The meadows offer a brief stopping point for trans-Sierra travelers and serve as headquarters for high country backpacking trips and day use climbing on the many domes in the surrounding area. Picnicking in the meadow area is popular, as are day hikes along the many trails that lead into the surrounding wilderness area from the pullouts along Tioga Road.

Visitor Facilities

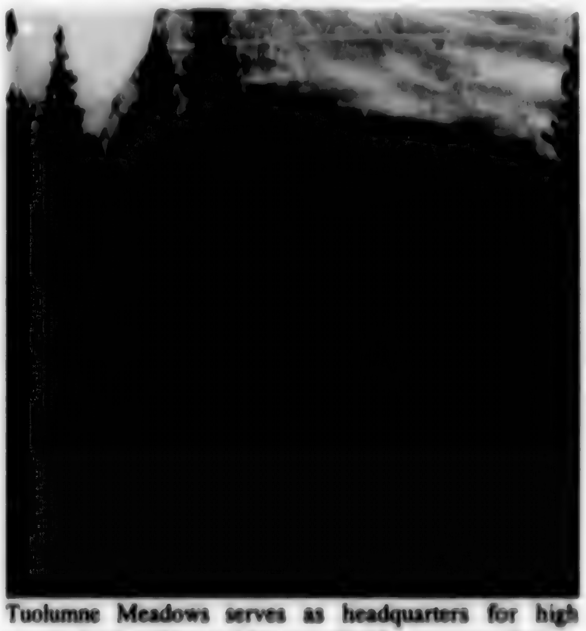
Tuolumne Meadows contains a lodge, which is composed of a main building housing registration and dining facilities and 69 tent cabins. The concession services plan calls for the removal of three tent cabins and relocation of the dining room away from the river. A total of 155 indoor dining seats would be provided at the new dining room and a fast food outlet to be relocated to the Tuolumne Meadows store. A new store building, accommodating a camp store and mountaineering shop, is planned. The stable on the north side of Tioga Road would be relocated to an area of pine habitat to reduce environmental impacts.

A development concept plan (DCP) will be prepared to identify specific locations for each of these facilities. The plan should consider visitor transportation needs in the location of facilities. The operation of visitor transportation systems serving the area will need to be adjusted in coordination with future development plans.

At present, the Tuolumne Meadows campground accommodates 314 individual parties and 8 groups of up to 30 people. A total of 220 backcountry users typically access camping sites from the meadows area, along with users of 56 High Sierra Camps lodging units.

Visitation

The popularity of Tuolumne Meadows has grown steadily over the past few years. Parking by backpackers, day hikers, and others spills out of the inadequate formal and informal roadside parking areas onto the shoulders of the road. Visitor entries through the Tioga Pass entrance station increased 8% between 1988 and 1991. Tioga Road also has become increasingly popular as a tour bus route into the park.



Tuolumne Meadows serves as headquarters for high country backpacking and day use climbing on many domes.

The general management plan calls for 1,485 day use visitors and 2,048 overnight visitors in the meadows area. A total of 1,260 day use visits to the Tenaya Lake and Tioga Pass areas are also called for. The plan does not specify if any of the visitor trips to these independent areas would be combined. These levels refer to visitors who actually stop at the area. They do not consider through traffic on the Tioga Pass road. The June 1991 traffic counts indicate that nearly 9,000 visitors passed through the area on a typical summer day. The 2,745 day use visitor trips to the area would require between 800 and 950 vehicle trips, depending on the number of visitors served by bus. The 2,048 overnight visitors would require about 500 parking spaces in addition to the day use space needs.

Roadway System

Tuolumne Meadows is reached by Tioga Road. It is approximately 55 miles from Yosemite Valley via Crane Flat. The road has two travel lanes and provides direct driveway access to many facilities. Short access roads connect to the campground, stables, and lodge. The road surface is generally in good condition and the road is adequate for the volume of traffic it carries. Conflicts arise at parking access points and where roadside parking occurs.

Parking Facilities

A total of 432 formal parking spaces are located in the meadows area between the visitor center and Tuolumne Lodge. Overflow parking occurs adjacent to several formal parking lots, as identified in appendix 2.

A variety of trailheads, climbing approaches, and picnic areas are scattered along Tioga Road for approximately 10 miles west of Tuolumne Meadows to Olmsted Point. Parking occurs in designated and informal locations throughout the day. More than 200 parking spaces are located within designated parking lots along this stretch of road. Several pullouts and roadside strips are also well used.

Visitor parking is provided at the following locations in Tuolumne Meadows and along the adjacent section of Tioga Road.

Tuolumne Meadows Visitor Center (25 parking spaces). The parking area at the visitor center is arranged in a cul-de-sac, with parking spaces located around the fringe. The lot is paved and striped, but has no defined circulation pattern. Large vehicles and buses have a very difficult time maneuvering through the area and can create conflicts with traffic flow.

Tuolumne Meadows Store and Grill (41 parking spaces). This parking area is actively used. Visitors stop here for supplies, meals, and directions. The paved and striped lot is readily visible from the main road and receives steady use.

Tuolumne Meadows Gas Station and Climbing Shop (20 parking spaces). Vehicle service and maintenance is provided at this location, along with a climbing shop. The paved parking lot is disorganized and many vehicles park in the rear for extended periods.

Lembert Dome (25 parking spaces). The distinctive Lembert Dome is readily visible from Tioga Road and attracts many of the visitors passing through the area. The gravel parking lot is typically full. Visitors hike, climb, and picnic in the area.

Many visitors stop for supplies, meals, and directions at the Tuolumne Meadows store and grill.

Soda Springs Trailhead (10 parking spaces). A small gravel parking area is located at the east trailhead to Soda Springs. Various other backcountry destinations may be reached from this point. Vehicles are generally parked for long periods.

Tuolumne Meadows Stable (65 parking spaces). The parking area at the stable is gravel and large enough to handle the typical level of activity. Pavement and striping could help to increase the capacity of this lot.

Wilderness Permit Lot (62 parking spaces). This paved parking area serves a permit office and backcountry registration center. Overnight backpackers leave their vehicles at this area during their stays. The lot is striped and provides good circulation but often receives use beyond its designed capacity.

Dog Lake Trailhead (81 parking spaces). This paved and striped parking area is available for use by day hikers and backpackers. The lot is located at the Dog Lake trailhead but offers access to several other trails in the immediate vicinity. Parking use is generally long term.

Tuolumne Lodge (103 parking spaces). The Tuolumne Lodge has 69 overnight visitor units. The paved and striped parking area is available for lodge guests and visitors.

Informal Parking Locations in Tuolumne Meadows:

- Lembert Dome strip parking
- Soda Springs strip parking
- Tuolumne Meadows strip parking

Visitor Transportation System

The Tuolumne shuttle is the newest of the free shuttle services provided to visitors in the park. Operation began in 1991 with a local shuttle serving the major destinations in Tuolumne Meadows. Due to the shorter visitation season at higher altitudes, and the winter closure of Tioga Road, service is provided from early July through Labor Day. Shuttle service is available between 7:00 a.m. and 7:00 p.m. Two separate routes now provide visitor access to key activity locations in the Tuolumne Meadows area and along Tioga Road to the west. Both routes and the stops are displayed on the accompanying map.

Limited formal parking exists at trailheads along Tioga Road outside the meadows area.

The Tuolumne Meadows local shuttle circulates along an 8.5 mile loop between Pothole Dome trailhead on the west end and Tuolumne Lodge on the east end. A total of 10 stops are served along the route, with intervals between vehicles of approximately 30 minutes. Stops are located at the majority of visitor access points and developed areas within Tuolumne Meadows. Some of the more frequently used stops include the Tuolumne Lodge, Lembert Dome, Pothole Dome, the visitor center, and the Tuolumne Campground registration office. Two shuttles operate simultaneously along the local route, which takes between 35 to 45 minutes to complete. Drivers are somewhat flexible in making designated stops based on observations of waiting passengers. Due to the experimental nature of the system, some visitors may also be picked up at informal locations.

An additional shuttle was added in 1992 to provide expanded service along Tioga Road between Tuolumne Meadows and Tenaya Lake. The Tenaya Lake express shuttle operates during the same visitor season as the local bus but with a compressed daily schedule (9:30 a.m. to 4:30 p.m.). The primary role of the express shuttle service is to move lodging guests and day use visitors between Tuolumne Meadows and Tenaya Lake. The total length of a round trip is just over 17 miles. There are only four designated stops: Tuolumne Lodge, the visitor center, Tenaya Lake, and the Tuolumne campground registration office. Stops are served in either direction in response to demand, and drivers are generally free to pick up passengers at other locations if it does not interfere with their schedule or create unsafe conditions. Only one shuttle operates along the express route; it makes the trip at hourly intervals.

Five vehicles are used for the shuttle services in Tuolumne Meadows and along Tioga Road. Four 12 passenger vans are used for the local service. Two serve as backups. The vans are somewhat unsuitable for continual boarding and unloading activities. A minibus with a seating capacity of 16 passengers is used for the express service to Tenaya Lake. Both the Tuolumne and Tenaya shuttle systems are owned and operated by the park concessioner. Funding is provided through surcharges on goods and services.

The Tuolumne Shuttle has been popular during its initial years of operation.

Transportation Conditions

Although Tioga Road traffic is well below the capacity of the roadway in the Tuolumne Meadows area, some traffic problems have been identified by the area ranger staff. Most of the problems involve conflicts between vehicles moving into and out of parking and activity areas and disruptions to through traffic from roadside parking and pedestrian movements. Additional traffic circulation is generated by shortages of parking at individual activity areas.

The most serious transportation problems in Tuolumne Meadows stem from overcrowded parking facilities. Especially troublesome situations arise when large RVs and tour buses attempt to use the area. The visitor center lot provides an excellent example of the problems which occur throughout the area. The 25-space lot is located at the end of a narrow driveway. No space is provided for turning vehicles larger than automobiles. If all the parking spaces are occupied when a large RV or a vehicle pulling a trailer enters the lot, entering and exiting vehicles are blocked until the large vehicle can back out.

Parking demand routinely exceeds the supply at many locations throughout the day. Many of the vehicles parked along the road and at trailheads outside the meadows belong to climbers who bring equipment along on their trips. Shuttle service for these individuals would need to accommodate that equipment.

Figures 19 and 20 show the occupancy of formal parking lots and overflow strip parking along Tioga Road in the developed area of Tuolumne Meadows. For the majority of the day, occupancy exceeds available capacity. Peak occupancy is 450 spaces. Along Tioga Road outside the Meadows area, a maximum of 325 parked vehicles were observed at formal and informal spaces, as shown in figure 21. The maximum number of cars parked in the entire area was about 770. Of this number, about half are estimated to belong to lodge visitors and backcountry campers.

Figure 22 shows parking durations at several lots in the Tuolumne Meadows area. The Murphy Creek trailhead, Tenaya Lake, and Lembert Dome lots serve mostly short-term parkers. The lodge serves a dual function, accommodating both short- and long-term parking. The other lots attract mostly long-term parkers. Knowledge of the duration of visits is critical to determining parking needs in the area.

At present, day users require a maximum of about 425 spaces. Depending on visitors' desired length of stay, up to 660 parking spaces could be required to accommodate day use visitation levels specified in the general management plan. Additional study of day user habits in the Tuolumne area would be very beneficial. The upcoming development concept plan could address visitor use patterns.

The Tuolumne shuttle was instituted to address parking shortages and to reduce traffic circulation in the area. Ridership has grown since the introduction of service, as shown in figure 23. Total 1991 boardings were just over 12,300 passengers for the Tuolumne area local shuttle; passenger levels increased to almost 13,000 in 1992 for the same service. The Tenaya Lake Express Shuttle carried more than 6,000 visitors in its first year of service in 1992. An annual operating budget of $66,921 in 1992 translates to an average cost per rider of approximately $3.50.

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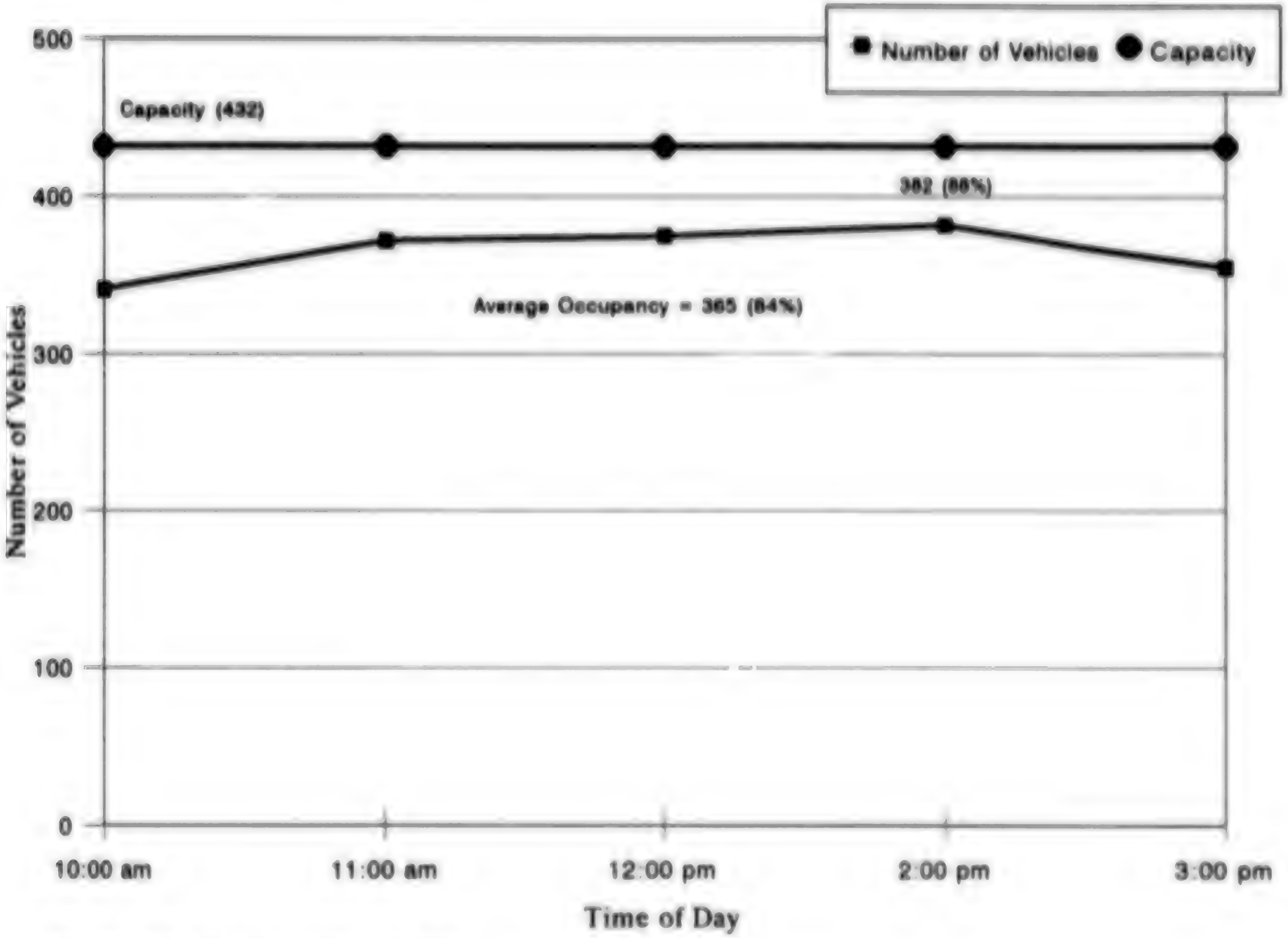
Figure 19: Yosemite National Park

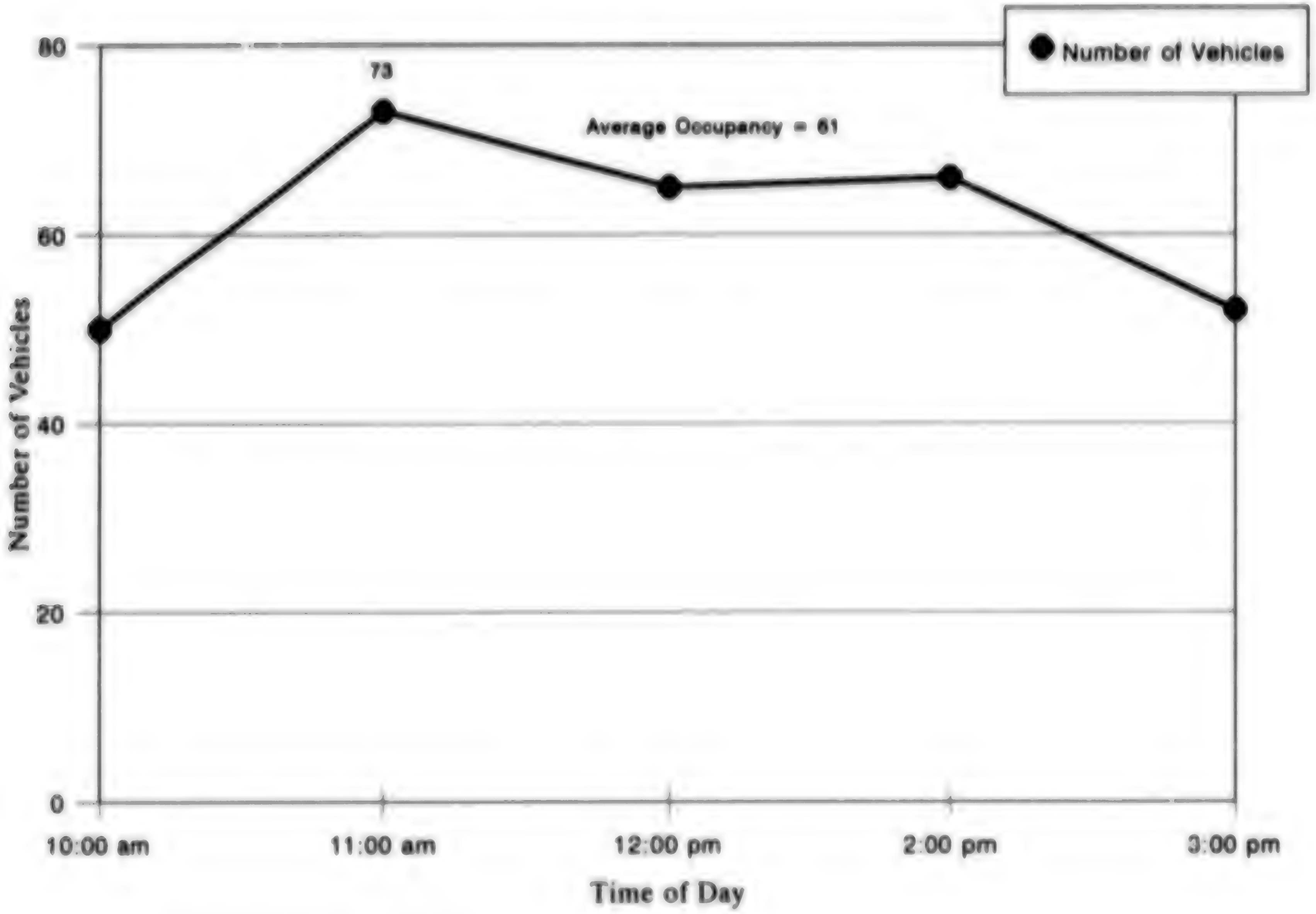
Tuolumne Meadows Development Parking Occupancy Summary



SOURCE: BRW field survey, August 29, 1992
NOTE: Limits of Tuolumne Meadows development includes all formal facilities between Tuolumne Lodge and visitor center, including facilities along access road to stables.

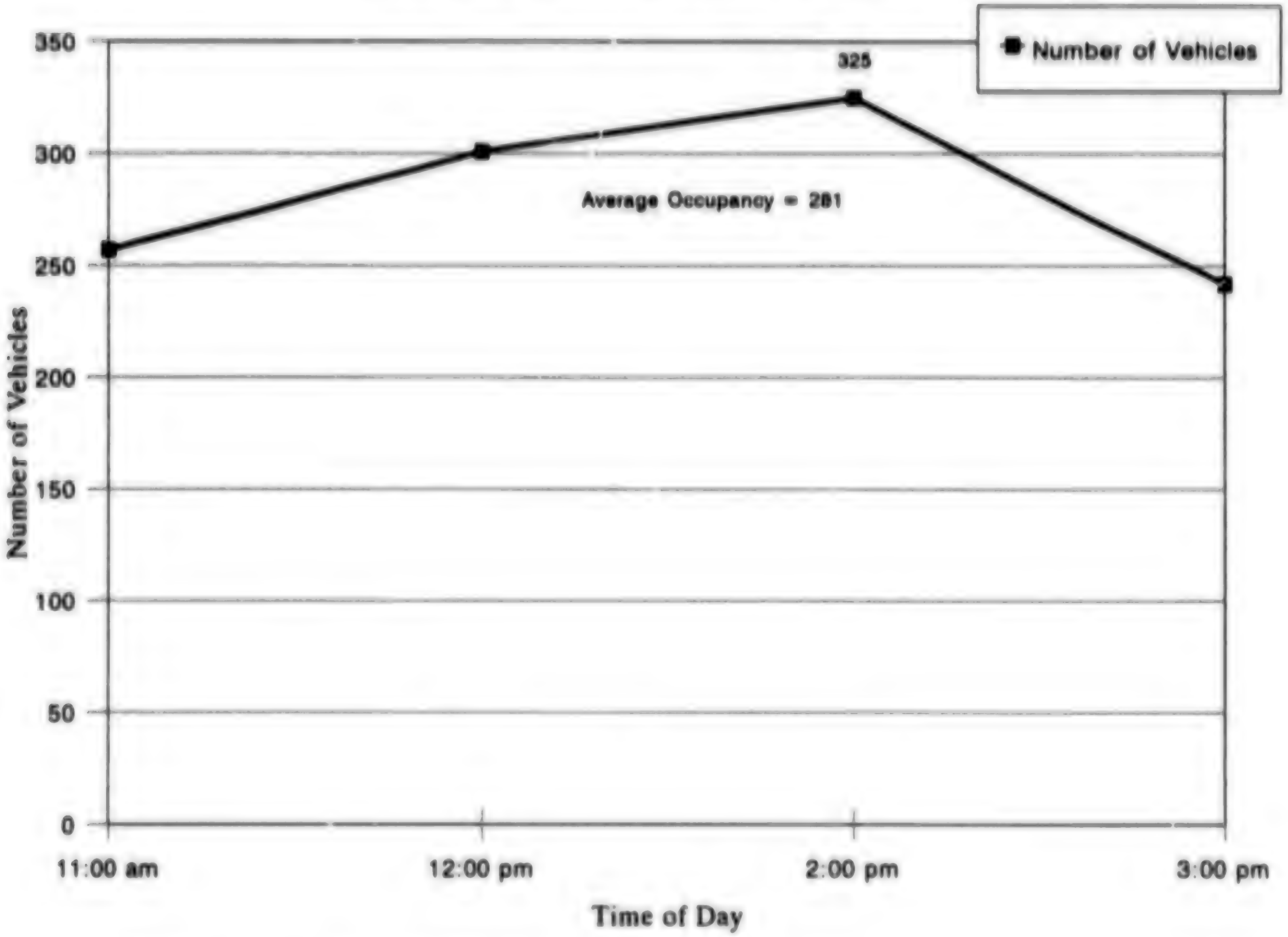
Figure 20: Yosemite National Park

Tuolumne Meadows Development Overflow
Parking Occupancy Summary



SOURCE: BRW field survey, August 29, 1992
NOTE: Tuolumne Meadows overflow includes Lembert Dome and Soda Springs trailhead overflow strip parking along access road to stables

Figure 21: Yosemite National Park
Tioga Road Parking Occupancy Summary



SOURCE: BRW field survey, August 29, 1992
NOTE: Limits of Tioga Road includes segment from strip parking area west of Tuolumne gas station to Olmstead Canyon (excluding Visitor Center). A total of 202 parking spaces exist in formal lots, remaining parking exists at informal pullouts.

Figure 22: Yosemite National Park

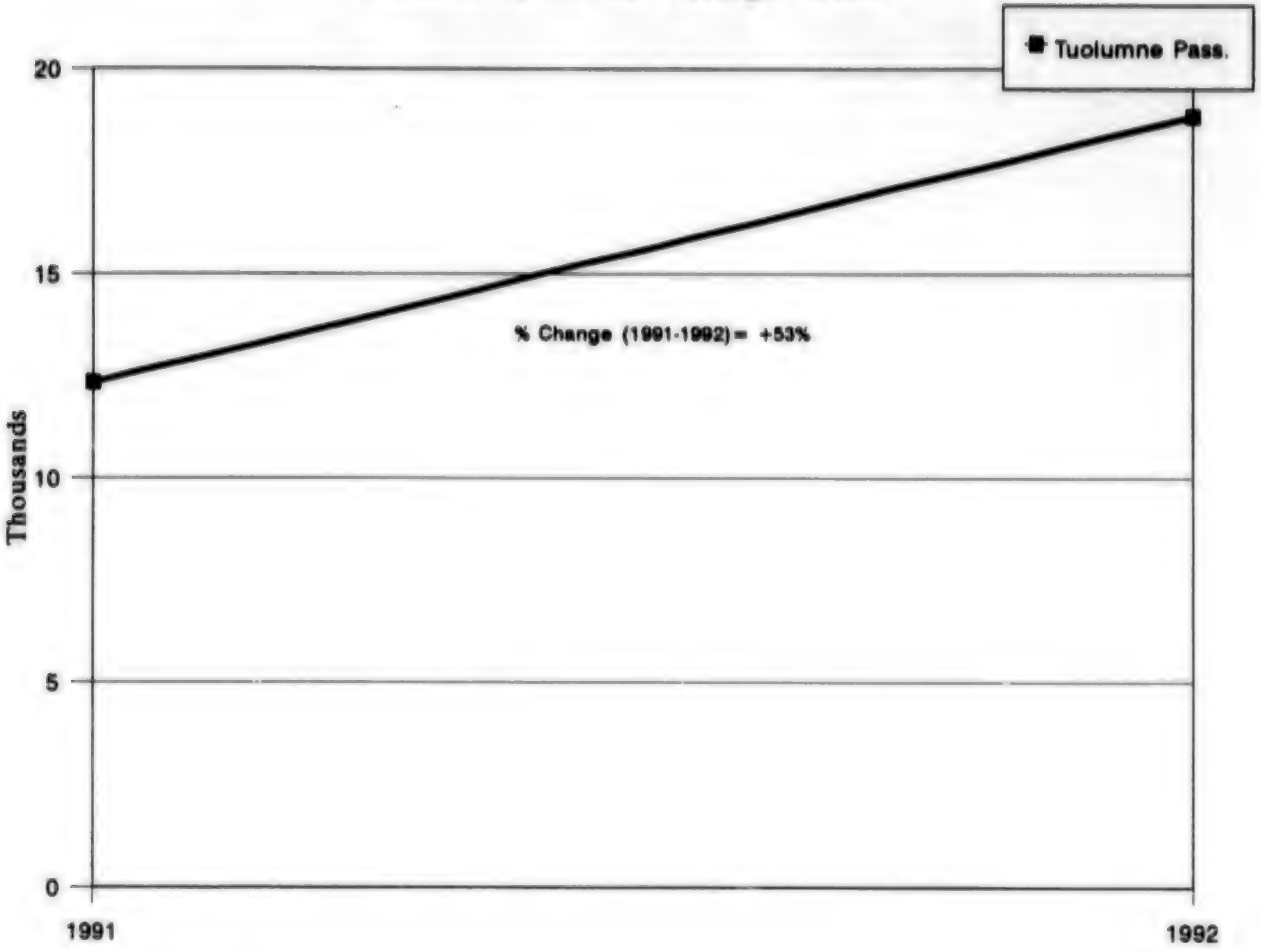
Tuolumne and Tioga Road Parking Durations

PARKING LOT	Sample Period Length (Hrs.)	LENGTH OF STAY 0–1 HOURS	 1–2 HOURS	 2–3 HOURS	 Over 3 HOURS	TOTAL	TOTAL COUNT	AVERAGE
TIOGA RD./TUOLUMNE								
CATHEDRAL LAKE TRAILHEAD	4	14%	9%	41%	36%	100%	22	2.50
FAIR VIEW DOME	4	17%	0%	33%	50%	100%	6	2.67
MARIUOLUMNE DOME	4	0%	20%	60%	20%	100%	5	2.60
SUNRISE LAKES TRAILHEAD	4	0%	20%	0%	80%	100%	10	3.10
MURPHY CREEK TRAILHEAD	4	70%	15%	6%	9%	100%	33	1.05
TENAYA LAKE PICNIC AREA	4	68%	32%	0%	0%	100%	19	0.82
LEMBERT DOME	4	66%	20%	14%	0%	100%	50	0.98
TUOLUMNE LODGE	4	36%	14%	14%	36%	100%	44	2.00
DOG LAKE TRAILHEAD	4	7%	30%	0%	63%	100%	30	2.70
WILDERNESS PERMIT	4	9%	16%	3%	72%	100%	32	2.88
TOTAL	40	37%	18%	12%	32%	100%	251	1.89

Source: BRW, Inc. field survey, August 30, 1993

Figure 23: Yosemite National Park

Tuolumne Shuttle Bus Passenger Counts



SOURCE: Yosemite staff
Note: Tuolumne service began in 1991

The biggest obstacle to greater shuttle use is the lack of parking convenient to shuttle stops. A large supply of parking is needed somewhere along the route so that shuttle passengers can be directed to a specific location. The shuttle has proven to be convenient for lodge guests and campers who do not need to make additional vehicle trips and search for parking once settled at their overnight accommodations.

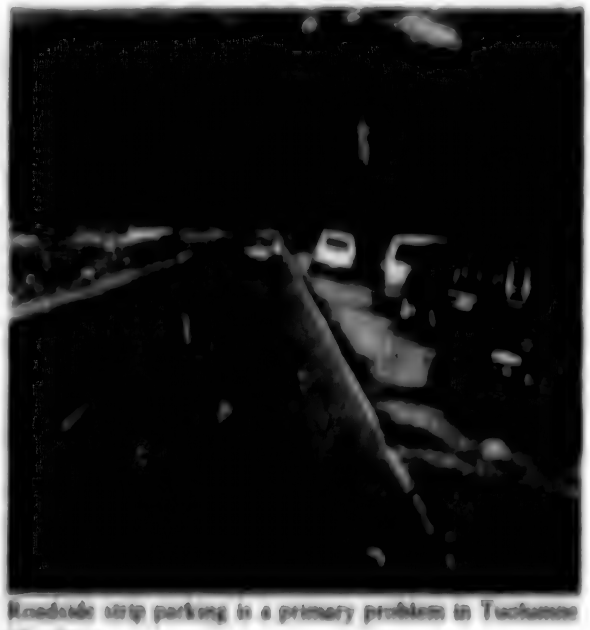
Resource Impact Issues

The Tuolumne River and Tuolumne Meadows are among the most critical subalpine wetland habitats in Yosemite. The meadows have been determined eligible for listing on the National Register of Historic Places; and the river through the Meadows is designated under the Wild and Scenic River Act. The accompanying map shows the most significant resources in the Tuolumne Meadows area.

Significant habitat and wetland disturbance and soil compaction are occurring in the meadows because of dispersed visitor facilities and parking, a lack of interpretive information about the sensitivity of the area. Extensive informal, pulloff roadside parking occurs and social pedestrian trails that crisscross fragile meadows and riparian areas have proliferated. The pulloff parking also destroys natural roadside vegetation and increases soil erosion from roadway runoff. In addition, the impacts to the river edge environment caused by the random social trail access are inconsistent with its scenic designation.

Visitor facilities at Tuolumne Meadows are dispersed in a fragmented pattern of development. There is no coherent, identifiable character of development. Older, architecturally significant buildings are mixed with temporary-appearing structures and with featureless recent permanent structures. Pedestrian circulation among the facilities is difficult, and interrupted by the numerous parking areas. Overall, the facilities do not provide a strong, identifiable sense of place or organization from which it would be possible to direct or control use of this most critical resource.

Wild and Scenic River. The California Wilderness Act of 1984 designated 83 miles of the Tuolumne River as a wild and scenic river, including 54 miles within Yosemite National Park, designated wild or scenic. Scenic portions include the section in Tuolumne Meadows. Human influences associated with interspersed developments and recreational use have impacted the resource values for which the river was designated.



Roadside strip parking is a primary problem in Tuolumne Meadows.

Manmade diversions and extractions from surface waters, combined with continuing drought conditions, have increased concerns over the potential for adverse effects on aquatic ecosystems in the Tuolumne River at Tuolumne Meadows.

Although water quality within the Tuolumne River is generally above state and Federal standards, there are concerns over the volume of visitor use and the subsequent impacts on water quality. Compliance with both the state and federal standards is mandatory. Given the amount of vehicle use within the Tuolumne Meadows area, contamination of surface water could originate from various pollutant sources, such as non-point source release of roadway hydrocarbons via runoff or accidental spills.

Riparian Habitat. The Tuolumne River and Tuolumne Meadows contain significant meadow, non-forest and wetland habitat with potential for a high concentration of wildlife species. Overall, these areas are extremely critical to the health and species diversity of park ecosystems. These fragile areas are also attractive to park visitors. Concentrations of visitor use are further encouraged by the location of park visitor facilities the dispersed parking areas within these zones.

Meadows Environment. Subalpine meadows, such as Tuolumne Meadows, are more sensitive than meadows at lower elevations because their shorter growing season makes natural and assisted revegetation more difficult.

Cultural Resources. Tuolumne Meadows has been determined eligible for listing on the National Register of Historic Places. In addition, several structures at the meadows are listed on the register.

YOSEMITE VALLEY EXISTING CONDITIONS

The map on the following page provides an overview of Yosemite Valley. The following discussion highlights those aspects of the valley and its visitors which are most significant for transportation planning.

Visitor Facilities

Yosemite Valley is the primary destination for most park visitors, offering spectacular views of many of the features which characterize the park, a variety of recreational opportunities, and the highest concentration of visitor facilities and services. The main visitor center and park headquarters are located in the valley, as are the residences of many NPS and concessioner employees. Yosemite Village contains most of the elements of a typical town, including a school, court, medical clinic, shopping, and housing.

A total of 1,215 lodging units would be provided in the valley under the concession services plan. In addition, 828 camping units are now provided in the valley. The general management plan calls for removal of 72 of these units, for a total of 765 camping units. The estimated overnight capacity of the valley is 4,866 people, based on average unit occupancy rates. The general management plan established a daily maximum of 7,711 overnight visitors based on the capacity of each unit, rather than typical occupancy.

The valley is the most developed and urbanized portion of the park. Visitor services and lodging are provided in five separate development clusters: Yosemite Lodge, Yosemite Village, Ahwahnee Hotel, Housekeeping Camp, and Curry Village, as shown on the Yosemite Valley Area Detail map. The westernmost development in the valley is Yosemite Lodge, which contains 495 lodging rooms and cabins. There are also several retail shops and restaurants. A swimming pool and bike shop are major daytime activity areas in the lodge complex. The restaurants and bar attract visitors from throughout the valley at meal times. A total of 635 indoor restaurant seats and 40 outdoor seats are called for at the lodge in the concession services plan.

Yosemite Valley attracts over 70% of all park visitors.

Yosemite Village is the most intensively developed area in the valley, containing the park visitor center, NPS and concession headquarters, NPS and concessioner maintenance facilities and warehousing, and employee housing. The Ansel Adams Gallery, medical facilities, and a variety of retail stores and restaurants are also located in the village. Much of the village area has confusing street patterns, overcrowded parking areas, and development typical of urban areas. A pleasant pedestrian environment has been created by the removal of parking facilities and automobile traffic south of the visitor center and west of the main village store. Some of the facilities and services now located in the village will be relocated. Among these are the valley garage, which now provides bus and automobile repair, a four-hour photo processing shop, video rentals, a bank, concessioner headquarters, and a concessioner-operated fire station.

East of the village against the north wall of the valley is the historic Ahwahnee Hotel, with 99 hotel rooms and 24 cottages. The hotel has a 425-seat dining facility, bar, sweet shop, and gift shop. The hotel offers deluxe hotel services in an environment of historic and rustic elegance. The large function rooms host many special events during the year. A small pool is available for guest use. The hotel's tennis courts will be removed under the concession services plan.

Curry Village is the largest lodging complex in the valley, with a total of 627 units, including motel rooms, cabins, and many tent cabins. The concession services plan calls for major changes in the Curry Village area, reducing the number of units to 365, consisting mostly of cabins with bath facilities. The area also contains a food service pavilion, ice rink, raft rental, swimming pool, bike rental, mountaineering shop (to be moved to the village), a small grocery store (to be expanded), and employee housing. The concession services plan calls for 250 outdoor and 400 indoor restaurant seats in this area.

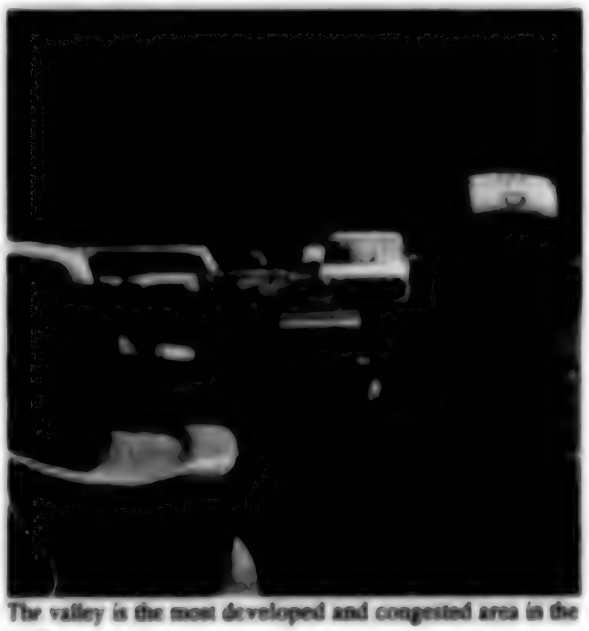
Housekeeping Camp is located to the west of Curry Village on the south side of the Merced River. This area offers accommodations in tent cabins. Unlike Curry Village, cooking is allowed in the Housekeeping Camp units. A total of 232 units are retained in the concession services plan. A small camp store is provided, along with showers and a coin-operated laundry.

Valley camping sites are organized into six main areas: Upper River, Lower River, Upper Pines, Lower Pines, North Pines and Sunnyside. A group camping area is located across from North Pines. Reservations are required for valley camping on a year-round basis. In addition to front country camping, 145 backcountry users typically access camping sites from the valley.

Visitation

Yosemite Valley is by far the most popular destination within the park, attracting 70% of private vehicle visitors and 100% of bus visitors. During each of the peak visitation months, approximately 462,000 visitors enter the valley, an average of 14,900 per day. The general management plan established a daily limit of 18,241 for valley visitation. Although direct counts of valley visitation have not been made, traffic management measures intended to maintain visitation at the GMP level are implemented on three to four weekend days during the summer.

Table 6 provides an estimate of inbound vehicle trips that will be generated by the various types of users in the valley when the general management plan and concession services plan are implemented. The trip generation of overnight visitors is lower than that for day use visitors because they stay an average of 2.7 nights. The estimates do not account for vehicle trips from the valley to other parts of the park and back by overnight users. Day use trips account for 77% of the vehicle trips entering and leaving the valley on a peak summer day. Lodging trips total slightly more than 14% of all vehicle trips.

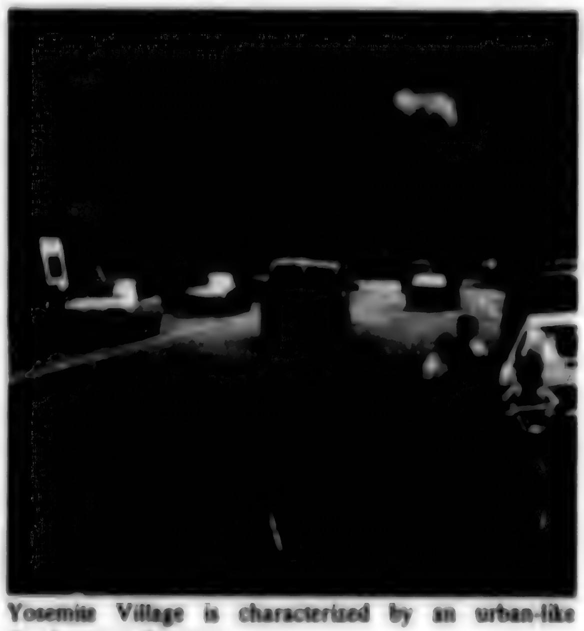


The valley is the most developed and congested area in the park.

Table 6: Yosemite Valley Daily Vehicle Access and Egress Trips by Visitors

User Type	Daily Users	% by Bus	Number of Units	Party Size	Vehicle Occupancy	Number of Vehicles	Max. Veh. in Valley	Length of Stay (Nights)	Daily Vehicle Trips
Day	10,530	15	NA	2.9	2.9	3,086	1,750	0	6,172
Hotel	3,679	15	1,215	3.0	3.0	1,033	1,033	2.7	765
Camping	4,032	0	765	5.3	2.9	1,390	1,390	2.7	1,030
Backcountry	145	0	145	1	2.9	50	50	2.7	40
Total	18,386	NA	2,125	NA	NA	5,559	4,223	NA	8,007

Source: BRW, Inc.


Yosemite Village is characterized by an urban-like development character.

The primary visitor attractions in the valley include short trails to the foot of Bridalveil and Yosemite Falls, the Happy Isles Nature Center and trailhead, Mirror Lake, and the various meadows that afford views of the valley walls and major rock formations. Typical visitor activities include driving from view to view, riding the valley shuttle to reach trailheads in the east end of the valley and other points along the park roads, biking along the paved paths paralleling the roads and in traffic-free areas in the east end of the valley, rafting on the Merced River, picnicking, and taking advantage of the many visitor services offered in the activity centers.

Roadway System

A system of one-way and two-way roadways provide access to Yosemite Valley and allow visitor and administrative circulation within the valley. The roadways winding along the flat valley floor are maintained year-round. Several bridges across the Merced River connect the roadway following the south valley wall (Southside Drive) with the roadway on the north (Northside Drive). One-way operation is maintained along Southside Drive from Valley View to Curry Village. Two segments of one-way operation are maintained on Northside Drive — the first from Stoneman Bridge to the village, and the second from Yosemite Lodge to Valley View. Two-way traffic is allowed between the lodge and the village on Northside Drive. A variety of special purpose and access driveways are connected to the main roadways, which have a pavement width of 21 feet and two travel lanes. The roadway system can be confusing to first-time visitors. Confusion, combined with overcrowded parking facilities, results in excess vehicle circulation, particularly in the area between Sentinel Bridge and Curry Village and in Yosemite Village.

Visitors entering the valley from the west have a real sense of arrival at El Capitan Meadow, where a full view of the 3,000-foot face of the monolith is revealed. The meadow is also the first location where visitors may feel the effects of crowding during months of peak visitation. Many cars are parked along the sides of the road from this point into the east end of the valley. The El Capitan crossover, which provides a connection between the one-way eastbound Southside Drive and the westbound Northside Drive, is the point at which traffic bound for the valley is diverted when congestion in the east end of the valley becomes too severe.

Leidig Meadow, about two miles east of El Capitan, provides an excellent view of Yosemite Falls. From this point east, visitors have entered the developed portion of the valley and are exposed to generally crowded conditions and pockets of almost urban levels of development and activity. On peak days, parking spaces are difficult to find. The designated day use visitor lot is at the far east end of the valley, remote from most of the visitor facilities and services that support day users. The network of interconnected one- and two-way roads is confusing, and the crowded conditions can disorient visitors.

Parking Facilities

Yosemite Valley has the highest concentration of development and the most parking spaces in Yosemite National Park. Varying estimates of the number of parking spaces in the valley have been presented in previous studies. Due to the extensive use of road shoulders for over-flow parking during periods of high demand, it is difficult to identify a specific parking supply. The National Park Service has estimated that a total of 5,055 parking spaces are available in the valley, including formal and informal lots and roadside areas. This study documented 2,247 spaces that are well-defined and apparently available for visitor use. Occupancy and turnover studies were conducted at the following lots:

Yosemite Lodge Complex (485 auto parking spaces, 1 bus parking stall). There are seven individual visitor parking areas at Yosemite Lodge. The parking lots are paved and striped and primarily used by people staying overnight. Other visitors who use the parking areas may be using the restaurants, gift shop, and special activities available at the lodge. The parking layouts are very efficient for auto use but only one formal bus stall is provided for the entire complex. Appendix 1 illustrates the location of the individual parking areas at Yosemite Lodge.

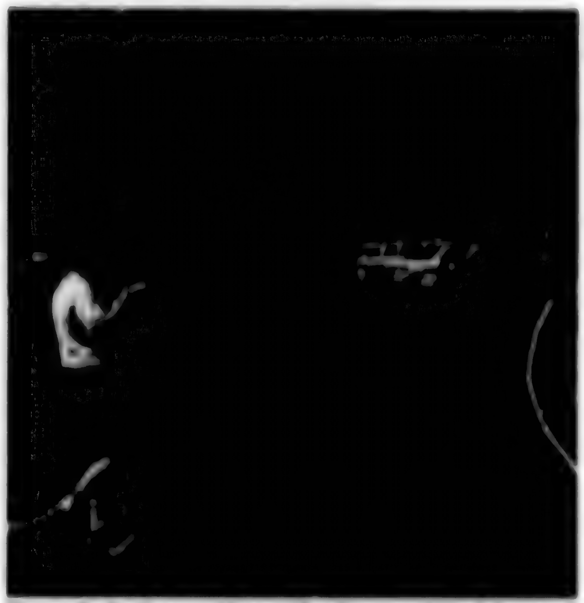
Curry Village (457 parking spaces). Six separate lots are available in Curry Village. Overnight village guests use the majority of the parking. Curry Village also has a cafeteria, swimming pool, bicycle rentals, a store, and an ice rink which generate demand for short term parking. Each lot is paved and striped. The largest lot is located directly adjacent to the valley's primary day use lot, which causes some confusion regarding the actual division between the two designated areas. Layouts for the Curry Village parking areas are shown in appendix 1.

Ahwahnee Hotel Complex (142 parking spaces). The Ahwahnee complex is served by two separate parking areas located to the northeast and northwest of the main hotel building. Hotel guests and visitors interested in viewing the facility or dining in the historic complex are the primary users of these parking areas. Separate parking is provide for employees. The lots are paved and striped, providing good circulation if users stay within defined spaces. The parking layout for the Ahwahee complex is shown in appendix 1.

Sunnyside Campground (84 parking spaces). Sunnyside Campground is a walk-in facility with 35 sites available for a maximum of 6 people per site. It is located directly north of Northside Drive and west of Yosemite Lodge. The lot is gravel and sometimes inefficiently used. The actual parking supply is often inadequate when the campground is heavily used. Spill-over parking occurs at Yosemite Lodge. A variety of hiking and climbing staging activities also take place in the parking area.

Yosemite Village (266 parking spaces). All major visitor facilities located in Yosemite Village are easily accessible by the shuttle bus system, but parking is provided at a few of the more popular locations. The following three facilities were identified as key Village parking locations:

- general store (179 spaces)
- Degnan's store and restaurant complex (16 spaces)
- visitor center (71 spaces)


Yosemite Lodge provides parking for overnight visitors and users of the restaurants, gift shops, and other facilities.

The general store is a primary stop for many valley visitors who need supplies or are shopping for souvenirs. People spending time at other locations in the valley will occasionally leave their vehicle in the store lot for longer periods of time. Parking duration is not monitored or enforced. The lot is paved and striped, but circulation is often difficult due to congestion from visitors searching for vacant parking spaces.

Degnan's Store provides a limited supply of parking for its customers. The paved and striped spaces are directly adjacent to the street. Traffic disruptions can occur as users back out of these spaces into travel lanes.

The Yosemite Valley Visitor Center parking area is remote from the actual facility. The lot is paved and striped and designed with a loop concept affording efficient circulation. Visitors seeking park orientation provide steady use of the parking area. Several other facilities are also accessible from this location, which contributes to longer parking durations for some users.

Curry Orchard, Primary Day Use Visitor Parking (420 parking spaces). All Yosemite Valley day use traffic is directed to this parking area adjacent to Curry Village at the east end of the valley. The lot is gravel and located in a former orchard. Parking spaces are defined only by evidence of previous use. The layout allows for loop circulation around vehicle rows but parked vehicles sometimes obstruct driveways.

Yosemite Falls (81 auto parking spaces, 12 bus parking stalls). Yosemite Falls is a focal point for viewing and hiking access within the valley. The parking area is the destination for most visitors and the only location designed to accommodate tour buses. Loop circulation is provided around the paved and striped rows. Pedestrian activity can sometimes cause unsafe conditions.

East El Capitan Parking Pullouts/Cathedral Spires Vista (46 parking spaces). Two roadside parking areas are located opposite of each other on the east side of El Capitan along Northside Drive. The parking areas are used by visitors seeking a close view of the El Capitan rock wall face or the Cathedral Spires to the south. Access is also available to trails leading to the base of El Capitan. Parking is generally for short durations while individuals take photographs and view the wall. The surface is paved and striped on the south side of the road, but is gravel on the north side.

Bridalveil Straightaway (10 parking spaces). This paved parking pullout area provides a spectacular view of Bridalveil Falls and its panoramic surroundings. Parking duration is generally very short.

Valley View (10 parking spaces). Ten paved and striped spaces are available at the west end of the valley adjacent to the Merced River. The pullout lot offers access to a viewpoint looking eastward into the valley. Short-term parking is typical. The open air tram carrying tour passengers through the valley makes a formal stop here and can impede some movements through the lot.

Bridalveil Fall (55 parking spaces). The parking lot at Bridalveil Fall provides access to a hiking trail leading to a waterfall vista. Parking space turnover in the paved and striped lot is frequent.

Four-Mile Trailhead (20 parking spaces). This paved parking area is designed specifically for visitors using the Four-Mile hiking trail that extends up to Glacier Point. Some motorists also make use of this area as a rest stop while circulating through the valley.

Swinging Bridge Picnic Area (22 parking spaces). The Swinging Bridge area offers a pleasant setting near the Merced River for picnicking, hiking, and relaxing. Paved and striped parking spaces are located directly adjacent to the road for easy access. Tour buses frequently use this area for short layovers, which increases vehicular congestion and pedestrian activity.

Yosemite Chapel (20 parking spaces). A small paved parking area is provided adjacent to Yosemite Chapel. Use is typically short-term unless services are being held.

Sentinel Bridge (26 parking spaces). A paved parking area is located on the northwest side of Sentinel Bridge and provides access to the Merced River and valley hiking trails. The parking lot also provides overflow parking for Yosemite Chapel.

Le Conte Memorial (6 parking spaces). The memorial has a very small paved lot that does not provide good traffic circulation. The location is not a high use area but captures the interest of many visitors who stop for a brief look.

Church Bowl (25 parking spaces). The church bowl lot provides gravel parking spaces along the side of the road near the Ahwahnee Hotel. It is generally used by visitors using hiking trails that lead out of the area.

Camp 6 (Undefined). The parking spaces immediately adjacent to the entrance drive are primarily used by park employees. The rear gravel lot at Camp 6 is designated for day use visitors and has undefined capacity. Vehicles typically are parked along the fringes of this open space. Currently there is no remote signage to direct visitors to this location. A formalized parking layout would help to maximize use.

Miscellaneous valley parking areas:

- Lower Brother pullout (10 spaces)
- Rocky Point pullout 1 (15 spaces)
- Rocky Point pullout 2 (3 spaces)
- Rocky Point pullout 3 (6 spaces)
- East El Capitan pullout 2 (10 spaces)
- Fern Spring pullout (5 spaces)
- Roosevelt/Muir campfire interpretation (10 spaces)

Visitor Transportation Systems

Two forms of visitor transportation are offered in Yosemite Valley: the valley shuttle and the valley floor tour. The shuttle is a free service, primarily intended to provide point-to-point transportation in the valley. The tram offers a recreational, interpreted tour of the valley for fare-paying visitors.

Yosemite Valley Shuttle Bus System. Shuttle bus systems in Yosemite Valley have operated in some form since the late 1960s. The current shuttle system operates year-round, offering service to the major developed areas at the east end of Yosemite Valley. During the summer months, 10 shuttles operate on an 8-mile loop with 19 stops. Fewer shuttles and a reduced schedule are maintained for the remainder of the year.

The shuttle stops are located adjacent to key facilities in the valley, such as Yosemite Village, Yosemite Lodge, Curry Village, Ahwahnee Hotel, and the various campground areas. A full route description is represented on the Yosemite Valley Shuttle Description map. The entire route takes approximately an hour to travel and shuttle arrivals are scheduled for 6-minute intervals. From June 23 through September 7, the service operates from 7:30 a.m. to 10:00 p.m. daily.

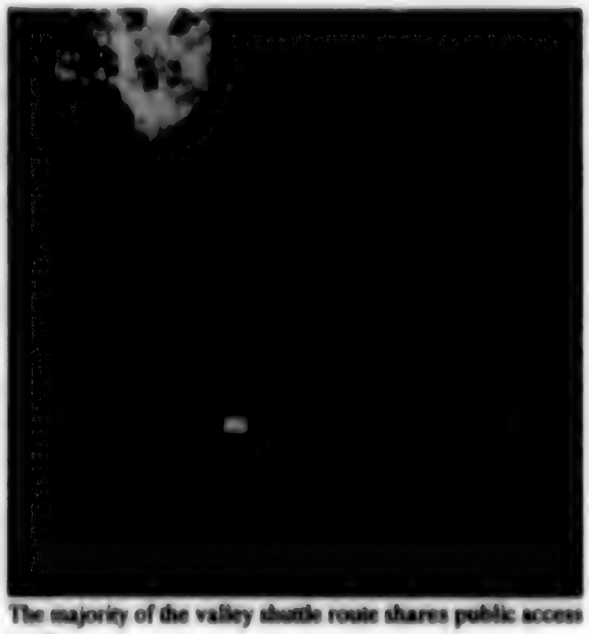
A fleet of ten diesel-powered buses was purchased by the National Park Service in 1982 for the valley system at a price of $146,000 each. The buses have each logged more than 100,000 miles of service. The buses have a capacity of 49 seats and 24 standees. The fleet includes three buses equipped with wheelchair lifts, at least one of which is in service during the entire daily schedule.

Drivers use a microphone to provide detailed descriptions of activities available at each stop, but no interpretation of park resources. The drivers also indicate locations where a transfer can be made in order to shorten a trip to a specific destination. Portions of the route are retraced by the shuttles during their loop, and stops are positioned across from each other for service in opposite directions. Each stop provides seating, trash receptacles, and a route map for waiting passengers.

The majority of the shuttle route follows public park access roads; short sections use restricted sections of roadway. Conflicts are often created for the shuttle buses by vehicular traffic, pedestrians, and bicyclists. Bus stop configurations at some locations may cause interference to the flow of traffic. In areas of high pedestrian activity, such as Yosemite Falls, shuttle stops can create hazardous conditions.

The buses are maintained at the valley garage. The concessioner is responsible for all operating and maintenance costs, which are funded by surcharges on visitor purchases. The National Park Service preapproves annual refurbishment and any repairs costing more than $1,000. The budget for valley shuttle services in 1992 was $1.1 million and ridership topped 3.3 million passengers. The operating cost per rider in Yosemite Valley was $0.32, based on 1992 operations.

Valley Floor Tour. Tours of approximately two hours in length are available throughout the day for visitors seeking an informative and scenic experience in Yosemite Valley. Open-air trams with a capacity of 70 passengers are used to carry visitors along the valley loop and to Discovery View. Tours offer viewing opportunities and interpretation of the valley's most prominent features. A tour guide is assigned to each tram to provide an extensive narration throughout the trip. The cost of the tour is $13.75 per person, and the trams are usually at capacity from late morning to mid-afternoon.

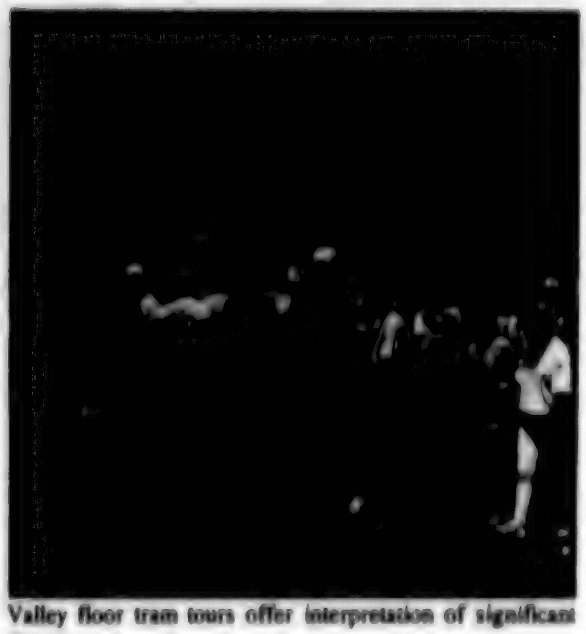


The majority of the valley shuttle route shares public access roads.

Transportation Conditions

As the park's major destination, Yosemite Valley experiences high traffic volumes that occasionally create gridlock congestion. Traffic management measures are required periodically to limit vehicle access. Traffic is diverted away from the valley during peak visitation days when parking has reached its capacity and congestion causes long back-ups at busy road intersections. The most congested locations are the intersections at Yosemite Village and at the entrance to the Yosemite Falls parking area along Northside Drive. Both of these intersections are on the two-way segment of the loop road system.

Hourly traffic volumes of up to 1,100 vehicles have been observed entering the valley on peak weekends. This flow rate is sustainable for about one hour, after which parking supplies fill and backups are generated from the village intersection towards Stoneman Bridge. When backups become severe, traffic entering the valley is diverted at the El Capitan crossover. This happens on three to four holiday weekends during the summer for periods of one to two hours. Other congestion points identified in the valley include the four-way intersection near



Valley floor tram tours offer interpretation of significant features.

Curry Village and the intersection with the Ahwahnee Hotel access road at the north end of the village. Traffic congestion in the valley causes long delays to visitors in private vehicles, leads to elevated vehicle emissions in the valley, and disrupts the operation of the valley shuttle system. In 1993, congestion become so problematic that visitors were turned away at the entrance stations on at least one summer weekend.

As shown in figure 24, 48.7% of private vehicle visitors and 55.1% of bus travelers use the valley shuttle service, according to visitor surveys. Daily shuttle ridership averaged morethan 22,000 passengers during the peak months in 1991, with as many as 26,000 passengers using the system in a single day.

Annual ridership is approaching 3.5 million people, as shown in figure 25. During peak holiday weekends and other high use days, the shuttle system often reaches capacity. Visitors can wait for several buses to pass before space is available. The highest volume stops include the Yosemite Lodge, Yosemite Falls, Curry Village, Happy Isles, Mirror Lake trailhead, and all the village stops. Locations that experience lower use include Sentinel Bridge, Upper Pines Campground, and the Ahwahnee Hotel. A portion of the visitors to Yosemite Valley ride the shuttle system as a tour or attraction without a particular destination in mind. On rainy days, riding the shuttle is a popular way to spend time.

Parking Occupancy and Turnover

Parking use inventories were conducted at the major public parking areas in the valley on Sunday August 30, 1992. Although this was not a peak visitation weekend, the results provide valuable information on the variation of parking demand over the day and an indication of the most popular parking locations in the valley.

The most heavily used parking was in the village area. As shown in figure 26, the 266 spaces in the village were fully occupied from the start of the inventory at 10:00 am until after 3:00 pm. The informal day use parking scattered throughout the valley accommodated 96 vehicles at approximately 12:00 noon, with use falling steadily through the afternoon as shown in figure 27. The primary day use parking area at Curry Orchard reached a maximum occupancy of 67%, also at about noon (see figure 28). Parking occupancy at the three primary lodging areas showed similar patterns of high use in the morning and evening, with somewhat lower occupancy mid-day. Maximum occupancy was 100% at the Ahwahnee, 89% at the lodge, and 65% at Curry Village. Figures 29, 30 and 31 show lodging area parking occupancy on the sample day.

Figure 32 provides a summary of the observed parking durations at 11 major parking areas in Yosemite Valley. The most prevalent parking duration was shorter than one hour. Longer parking durations were found at Camp 6, the day use parking lot, and Sunnyside campground. Figures 33, 34 and 35 show parking durations at individual lots in the valley.

On crowded days, most formal visitor parking is fully occupied, with parking spilling onto the roadway shoulders throughout the east end of the valley. This uncontrolled parking leads to pedestrian, bike, and vehicle conflicts; damage to vegetation and soils along the road edge; and the formation of social trails. The roadside parking also disrupts natural views and lends an urban character that is out of place in the valley setting.

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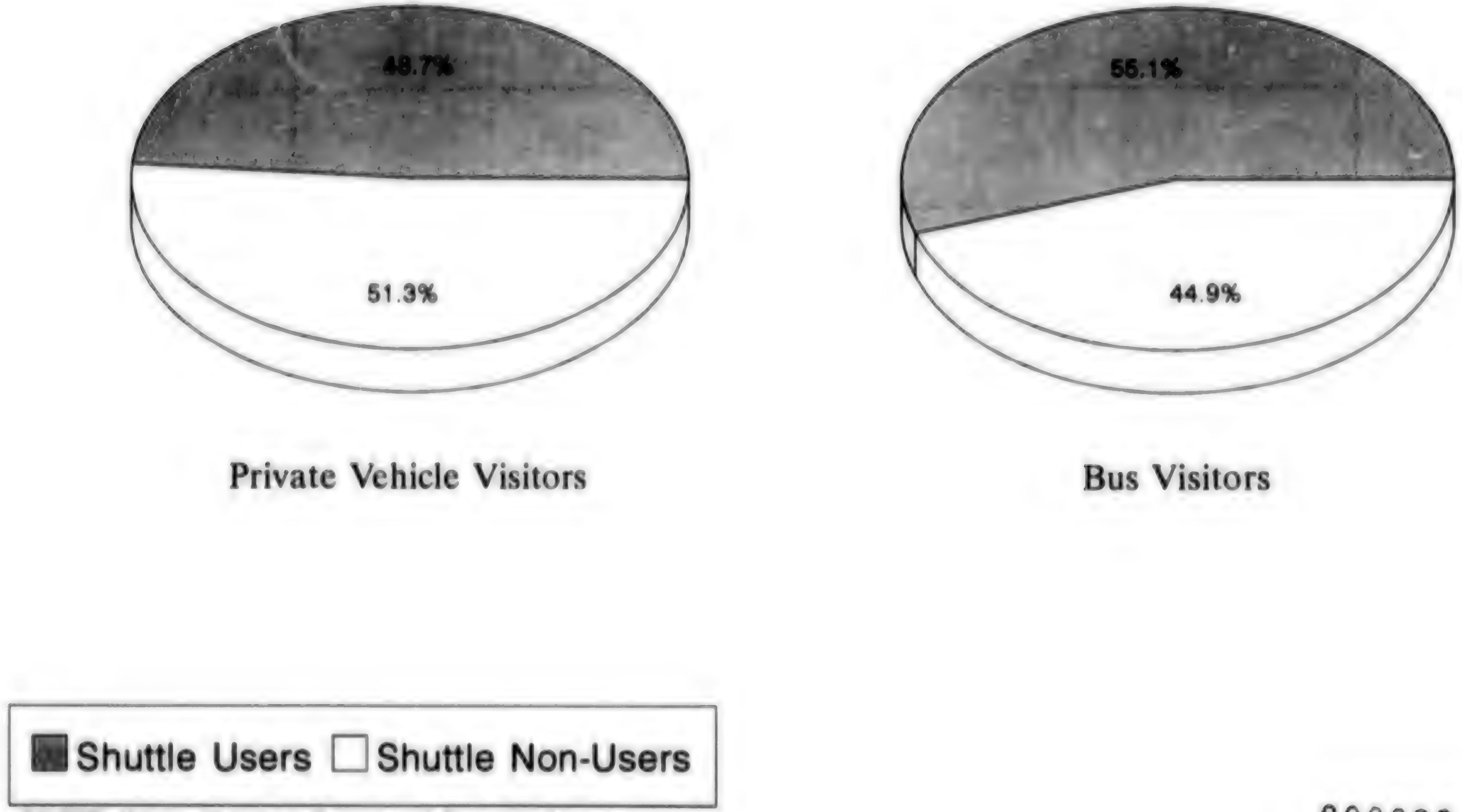
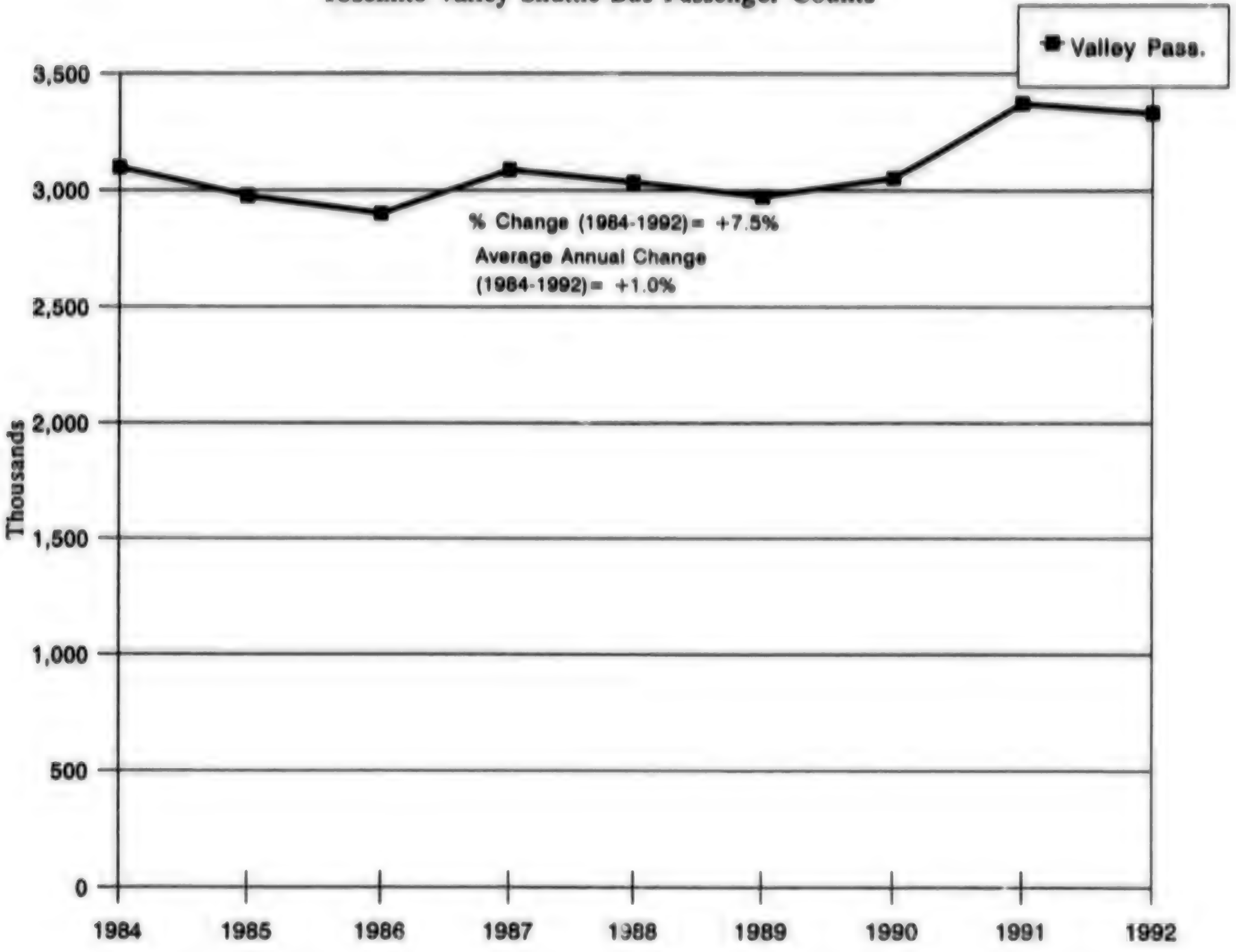
Figure 24: Yosemite National Park
Proportion of Valley Visitors Using Shuttle



SOURCE: Visitors, Alternative Futures, and Recreational Displacement at Yosemite National Park, Texas A&M, Jan. 1992

Figure 25: Yosemite National Park
Yosemite Valley Shuttle Bus Passenger Counts



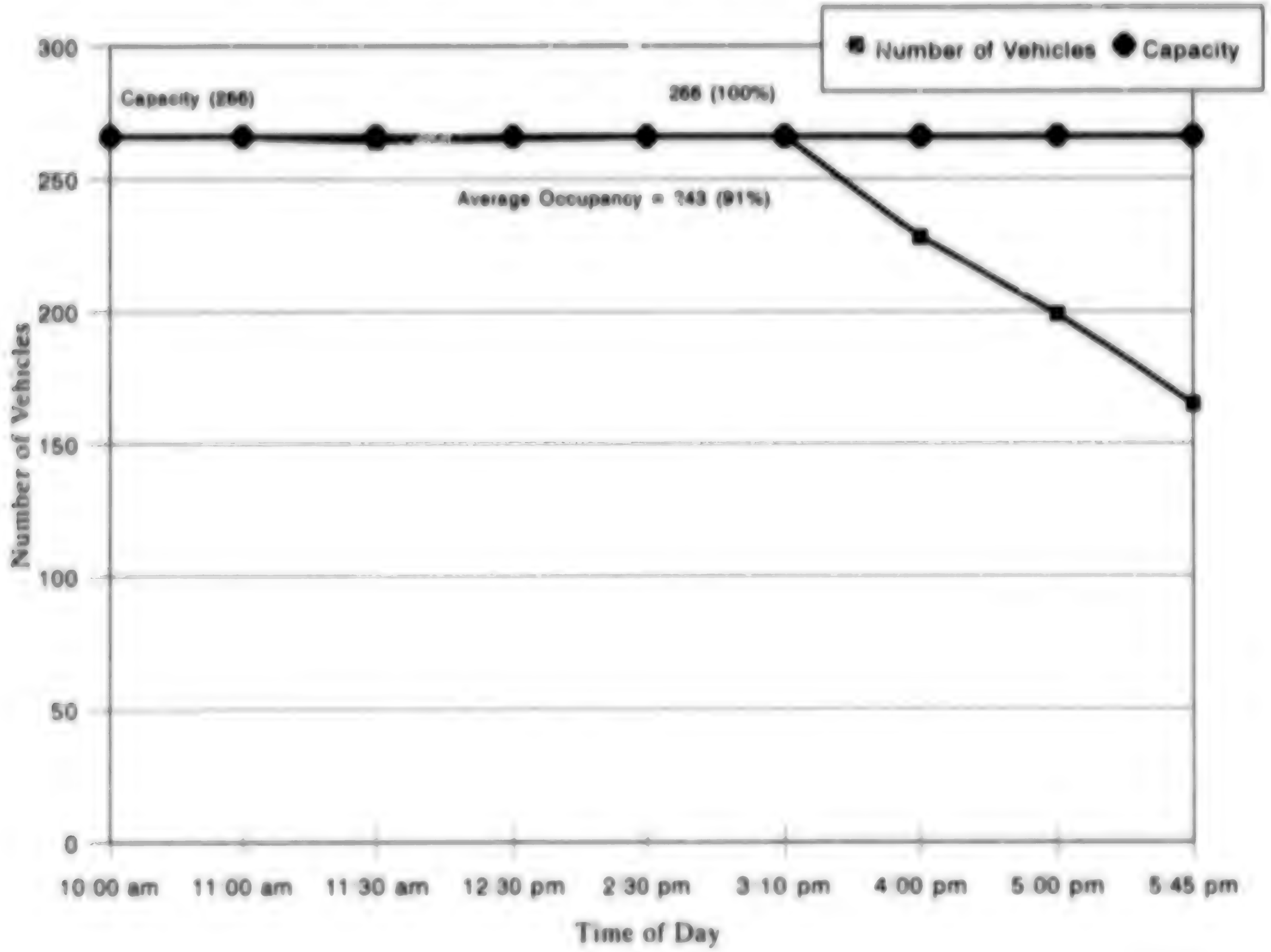
% Change (1984-1992) = +7.5%

Average Annual Change
(1984-1992) = +1.0%

SOURCE: Yosemite staff
NOTE: 7 day fire closure in 1990

Figure 26: Yosemite National Park

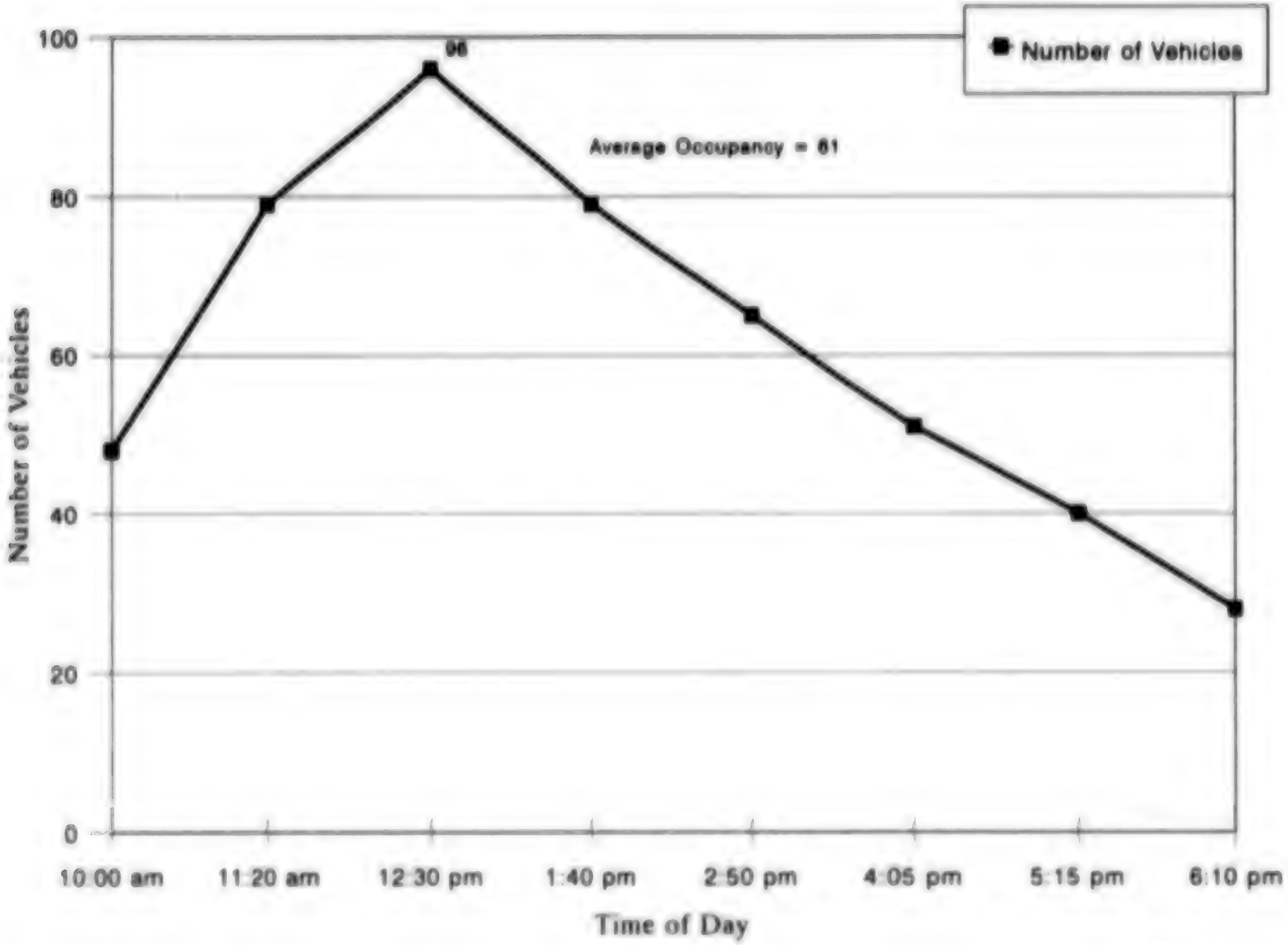
Yosemite Village Development Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1992

Figure 27: Yosemite National Park

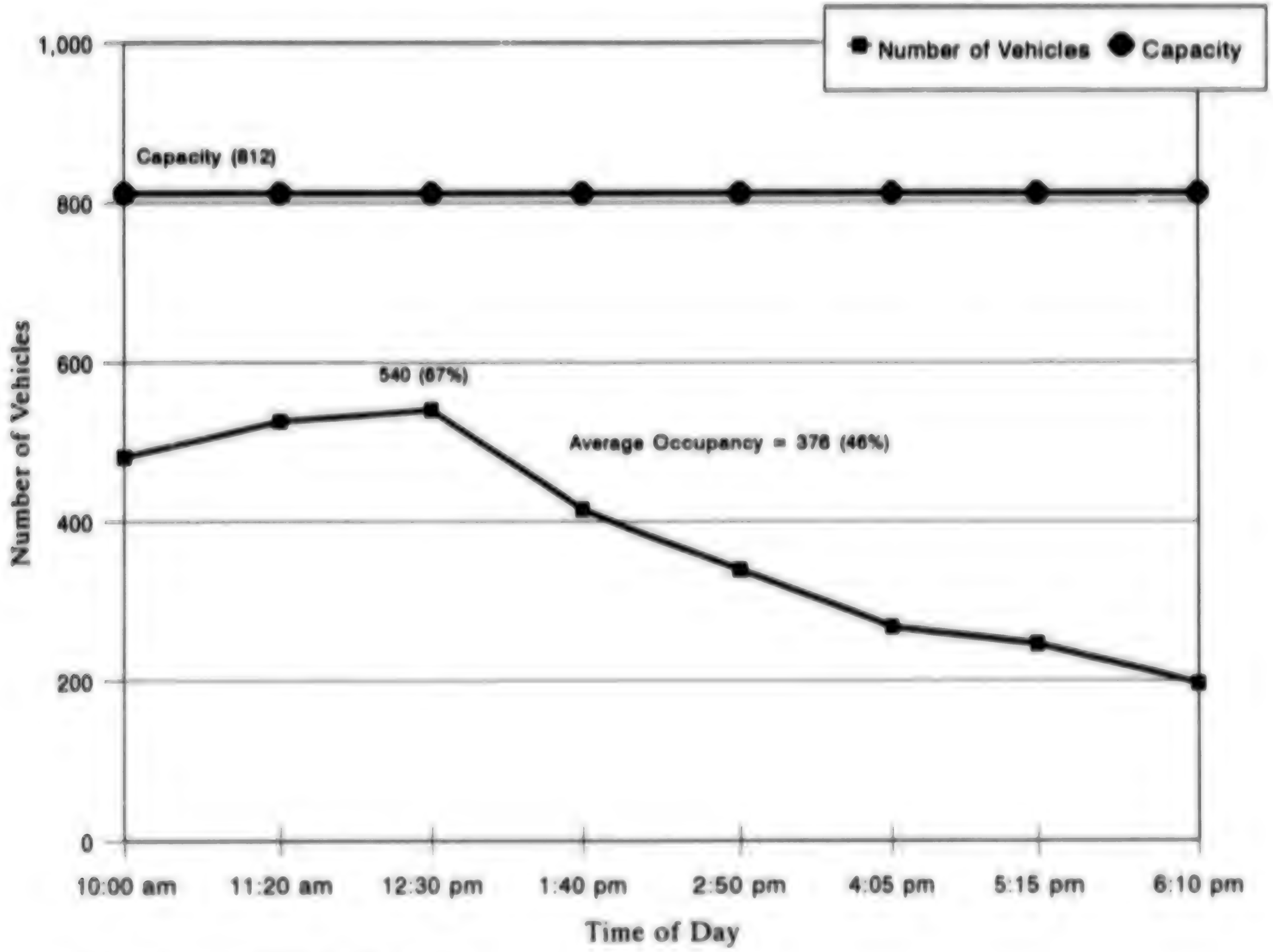
Informal Day Use Parking, Valley
Parking Occupancy Summary



SOURCE: BRW field survey, August 29, 1992

Figure 28: Yosemite National Park

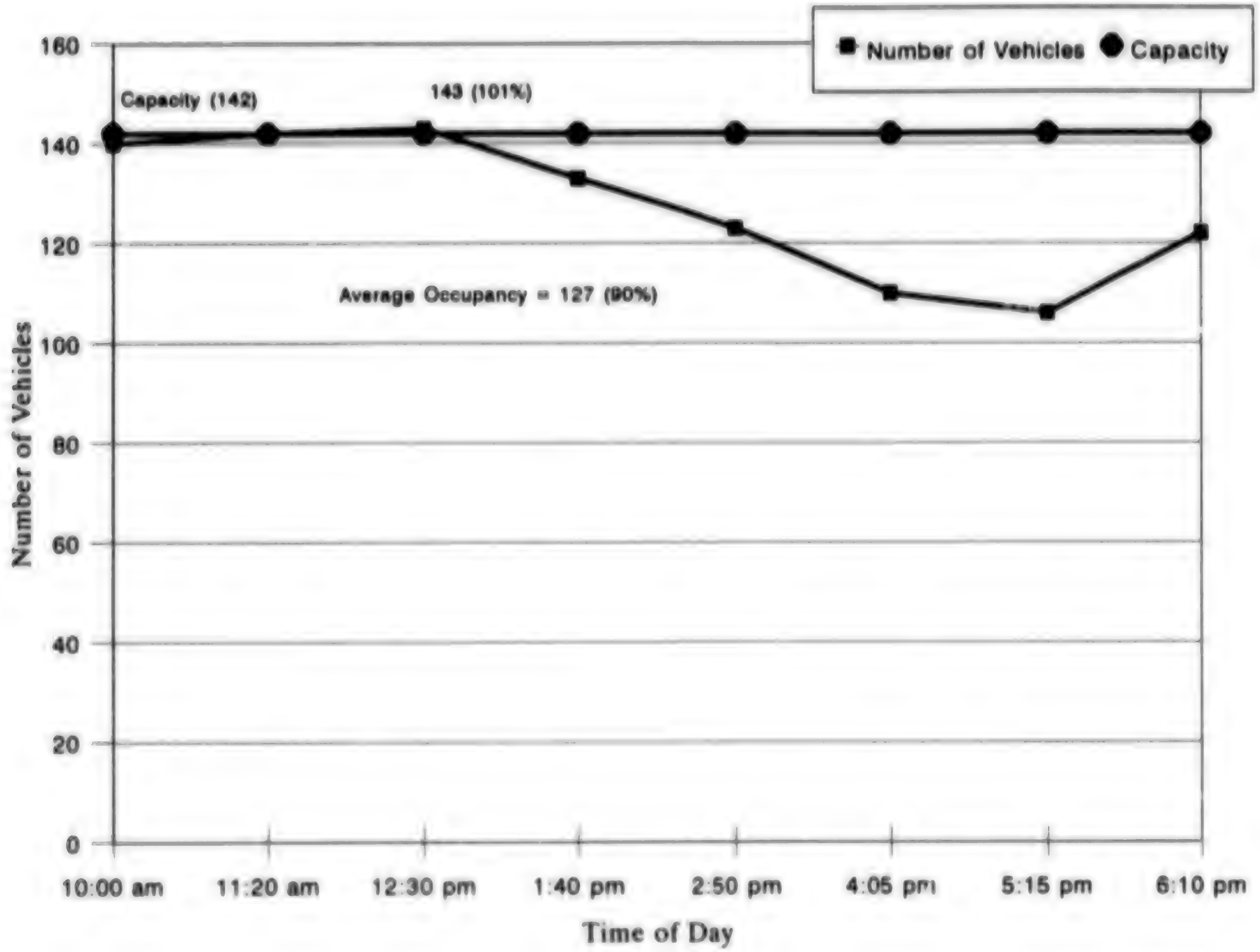
Formal Day Use Parking, Valley Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1992

Figure 29: Yosemite National Park

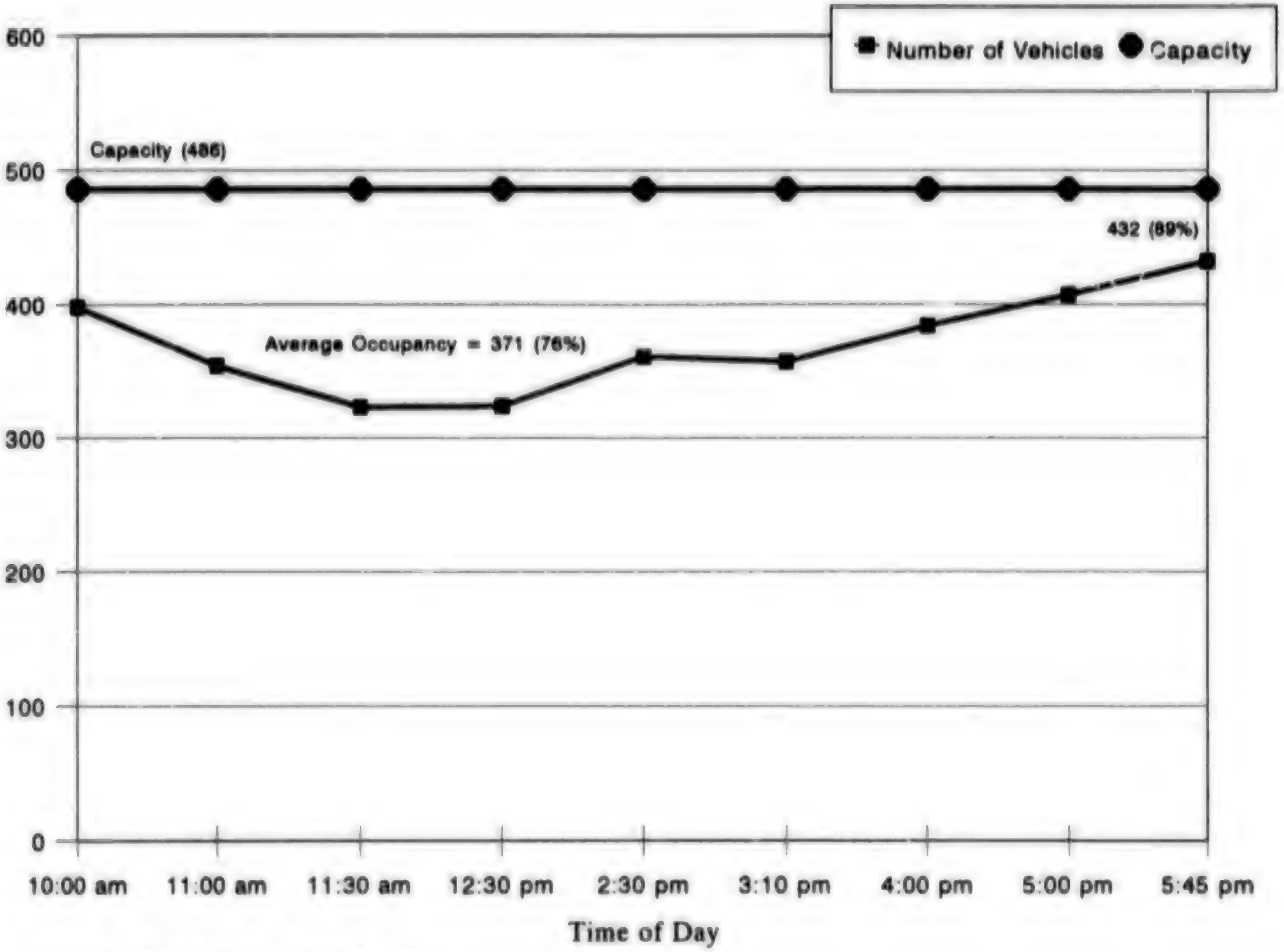
Ahwahnee Hotel Complex Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1992

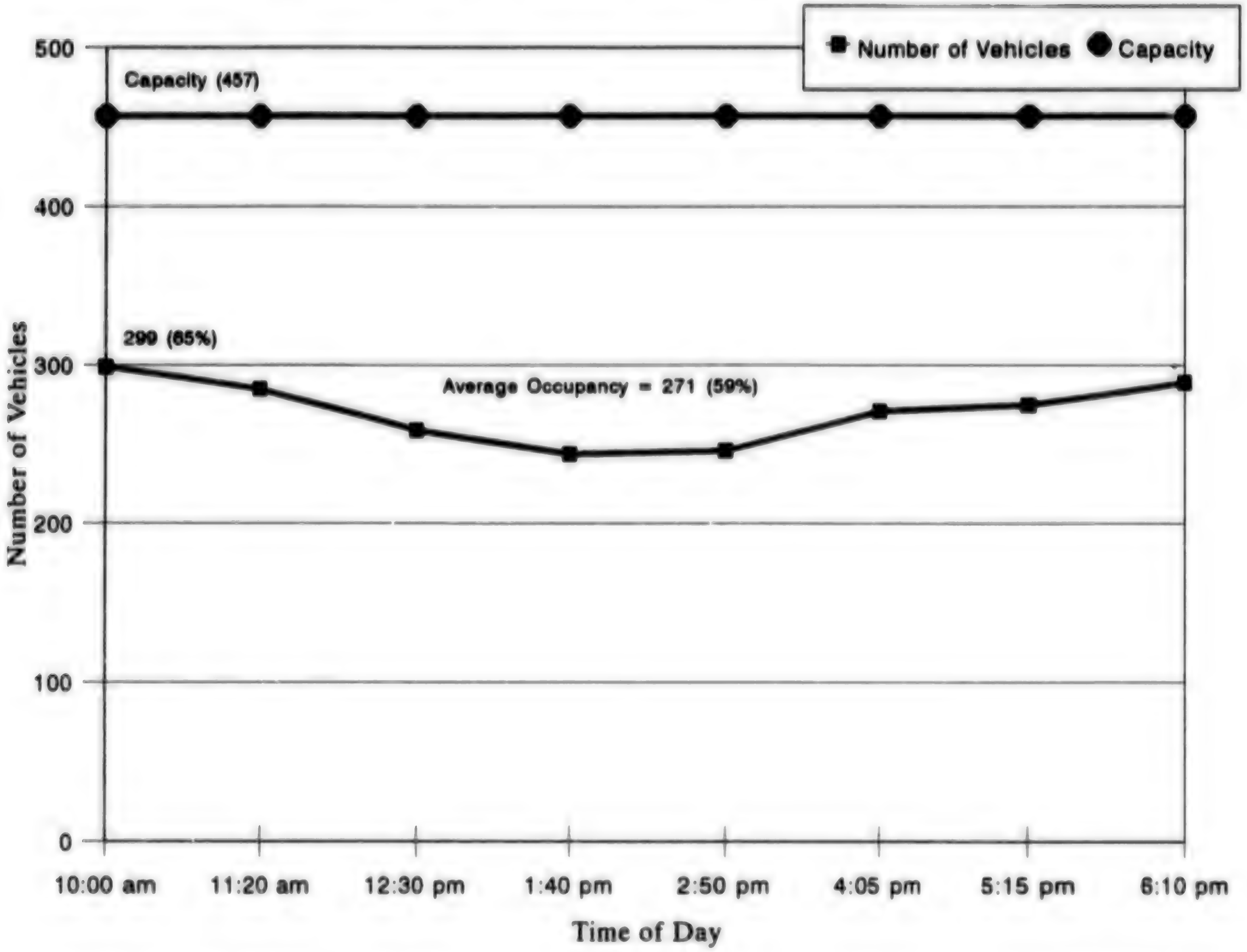
Figure 30: Yosemite National Park

Yosemite Lodge Complex Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1992

Figure 31: Yosemite National Park
Curry Village Complex Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1992

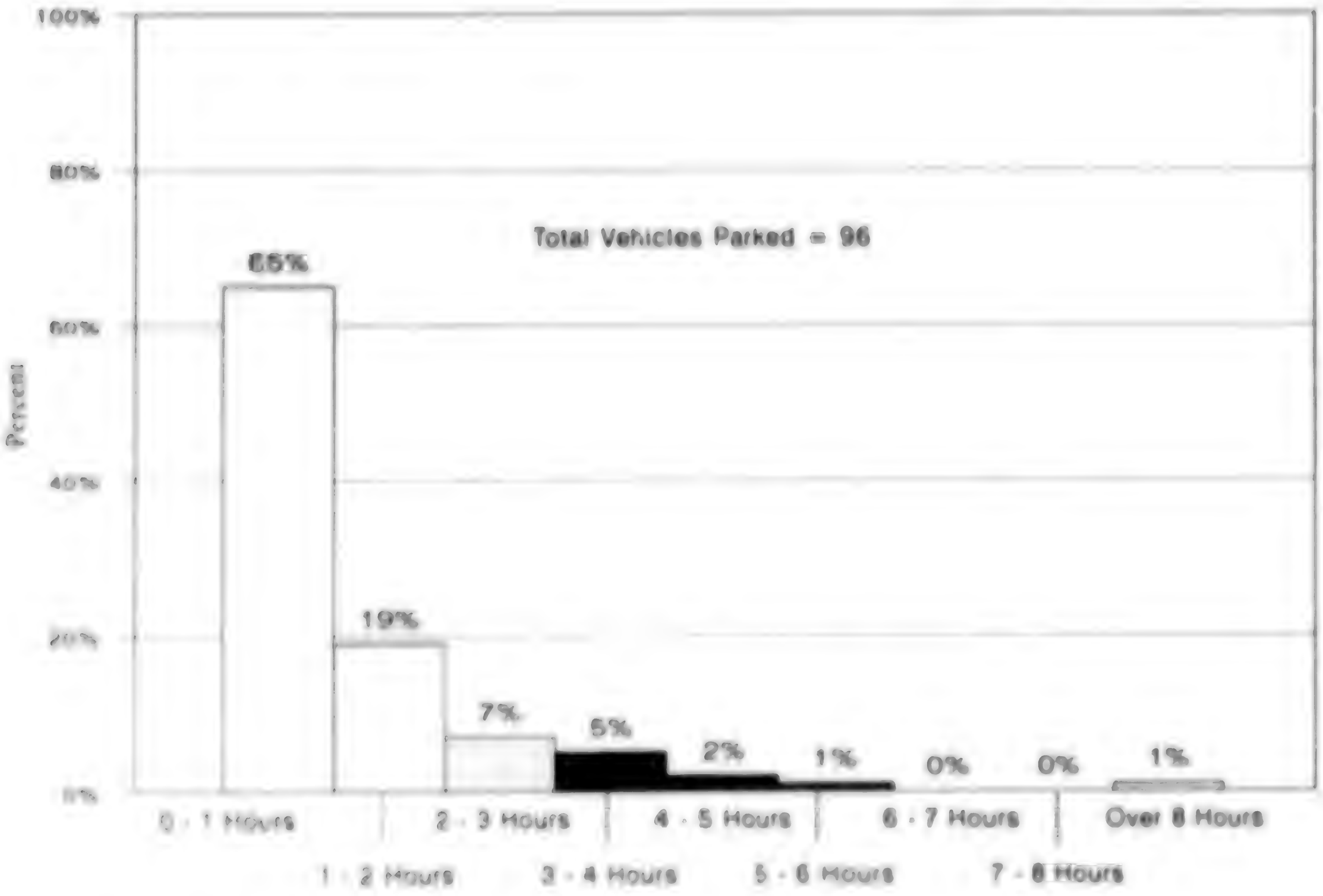
Figure 32: Yosemite National Park

Yosemite Valley Parking Durations

PARKING LOT	Sample Period Length (Hrs.)	LENGTH OF STAY 0–1 HOURS	1–2 HOURS	2–3 HOURS	3–4 HOURS	4–5 HOURS	5–6 HOURS	6–7 HOURS	7–8 HOURS	OVER 8 HOURS	TOTAL	TOTAL COUNT	AVERAGE
YOSEMITE VALLEY													
SUNNYSIDE CAMPGROUND	8	48%	14%	8%	6%	10%	2%	2%	10%	0%	100%	51	2.26
BRIDALVEIL FALLS	8	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	71	0.50
#6 CURRY VILLAGE	8	46%	18%	17%	6%	3%	2%	2%	5%	0%	100%	130	1.96
CURRY ORCHARD PRIMARY DAY–USE	8	34%	25%	12%	7%	5%	3%	3%	11%	0%	100%	73	2.49
#5 YOSEMITE LODGE	9	64%	17%	3%	3%	5%	3%	2%	0%	3%	100%	118	1.57
YOSEMITE FALLS	9	73%	13%	7%	5%	2%	0%	0%	0%	1%	100%	111	1.05
VISITOR CENTER	9	65%	19%	7%	5%	2%	1%	0%	0%	1%	100%	96	1.21
DEGNAN'S	9	64%	18%	3%	12%	2%	0%	0%	0%	1%	100%	97	1.27
GENERAL STORE	9	67%	16%	14%	1%	1%	0%	0%	0%	1%	100%	141	1.07
CAMP 6	7	33%	17%	13%	13%	0%	0%	25%	0%	0%	100%	24	2.79
#6 YOSEMITE LODGE	7	40%	19%	19%	4%	7%	0%	11%	0%	0%	100%	112	2.13
TOTAL	91	59%	16%	10%	5%	3%	1%	3%	2%	1%	100%	1024	1.55

Source: BRW, Inc. field survey, August 30, 1993

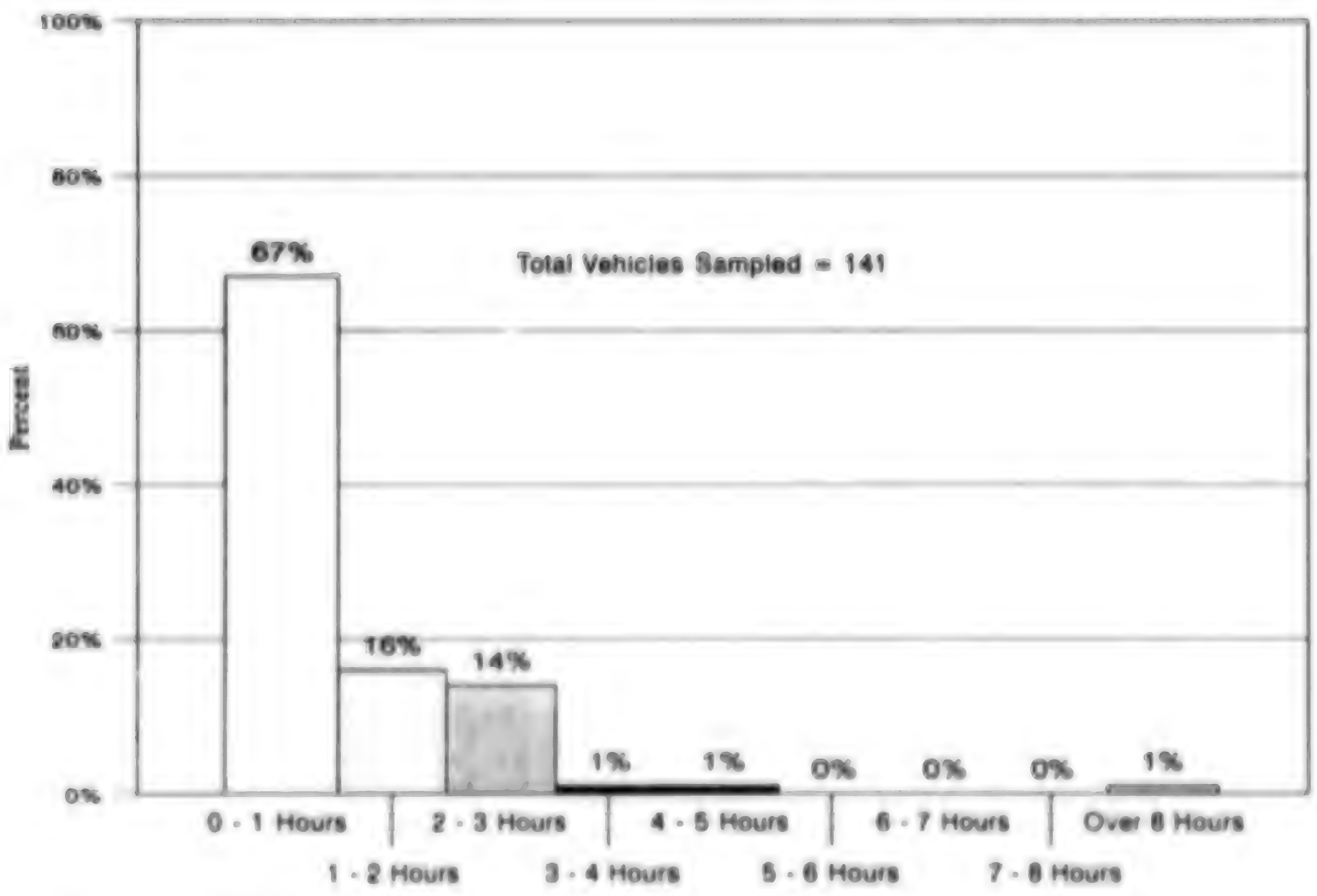
Figure 33: Yosemite National Park
Yosemite Valley Visitor Center Parking Durations



1/ [illegible] BRW field survey, August 28, 1992

Figure 34: Yosemite National Park

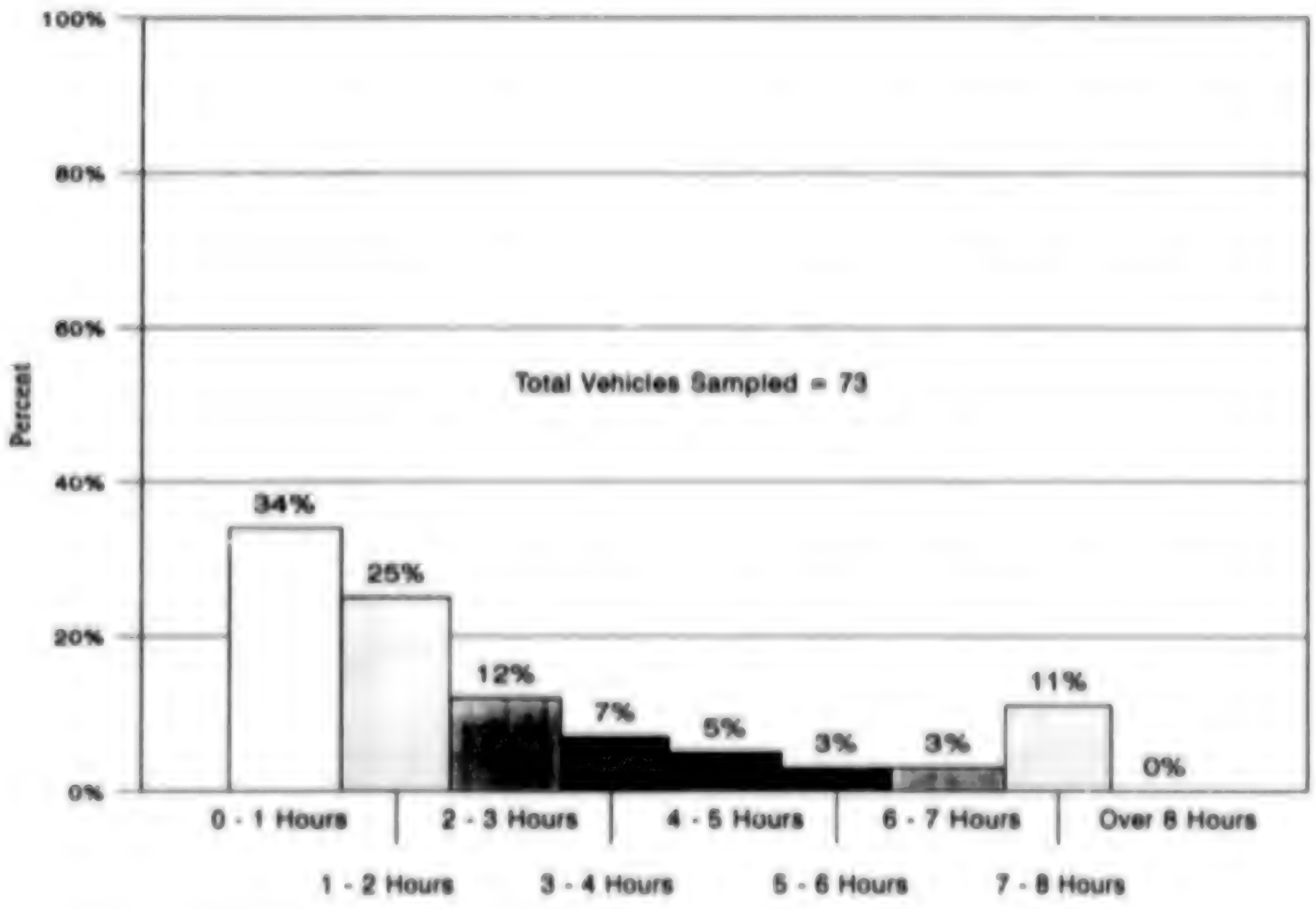
Yosemite Village General Store Parking Durations



SOURCE: BRW field survey, August 28, 1992

Figure 35: Yosemite National Park

Yosemite Valley, Curry Orchard Primary Day Use Parking Durations



SOURCE: BRW field survey, August 28, 1992

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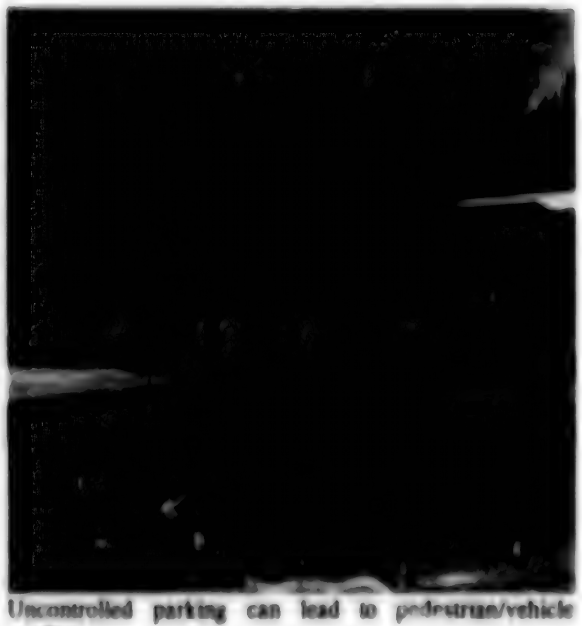


Uncontrolled parking can lead to pedestrian/vehicle conflicts.

Valley Resource Issues

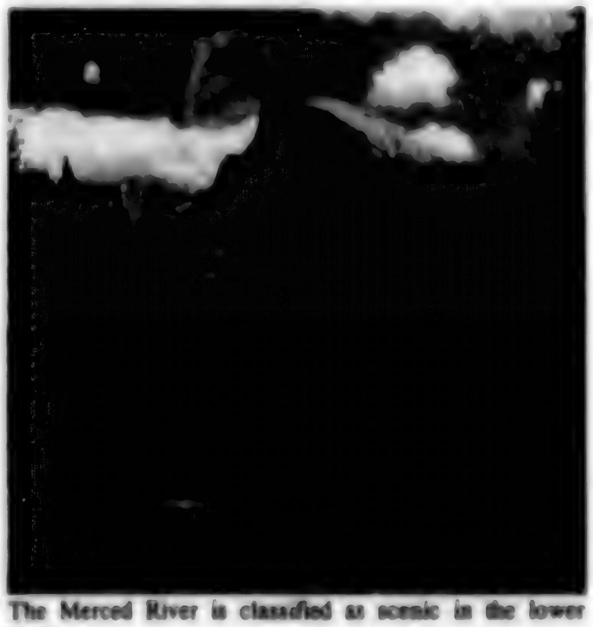
The following are the most important resource issues which may be affected by VTS alternatives in the valley. The attached map shows the locations of the most significant valley resources.

Air Quality. Yosemite National Park is designated as a class I area under the Clean Air Act, indicating the lowest allowable increments of degradation. Whereas a majority of air pollutants in the park are airborne from populated areas outside the park, fireplaces, campfires, and wildland and prescribed fires sometimes cause air quality to exceed federal and state standards for particulate matter, particularly in the valley. These also cause temporary reductions in visibility in the area. Vehicular emissions from traffic in high visitor use areas, like the valley, incrementally degrade air quality, contributing nitrous oxides, hydrocarbons, carbon monoxide, and particulate matter.

Geology/Soils. Steep topography, exfoliating rock surface, decomposing granite and highly erosive soils, combined with the Sierran ecology of natural fires and major flood events, produces serious geologic hazards to human safety along park roads and in Yosemite Valley in particular. Not all of the floodplains, rockfall zones, and debris and mudflow hazards are mapped. Planning for future projects may involve realignment of roads, relocation of overnight accommodations, campgrounds, and picnicking areas to avoid geologic hazard areas.

Soils in the Yosemite region are derived primarily from the underlying granite bedrock. The 1978 draft environmental impact statement of the general management plan identified limitations on use associated with some particular soils types. These limitations are primarily associated with frequently flooded areas and poor drainage in the valley, with severe slopes, and with shallow soil depth and difficulty of revegetation.

Water Resources and Quality. The main stem of the Merced River is under the protection of the Wild and Scenic Rivers Act from its headwaters near Mt. Lyell, to Lake McClure. The first and highest segment of the river above Yosemite Valley is classified as wild. The stream in the upper valley from the confluence of Illilouette Creek downstream to the Sentinel Picnic area, is classified as recreational. The Merced River in the lower valley, and through Merced Gorge, (from the Sentinel picnic area downstream to the park boundary), are classified as scenic.



The Merced River is classified as scenic in the lower Valley.

An interim boundary for the river corridor in the valley has been set at .25 mile on either side of the river or the valley wall, whichever is narrower.

Due to the concentrated human influence that has occurred along the Merced River over the last 100 years, significant loss of riparian vegetation and natural river channel morphology has taken place. Lowering the level of the Merced in 1879 by blasting the Bridalveil Moraine downstream has irreversibly changed the river and associated groundwater dynamics. Additional impacts include: the construction of dams, diversion walls, bridges, roads, and pipelines; the placement of stream bank riprap revetments; construction of buildings, visitor campgrounds, and picnicking areas within the floodplain; and intense visitor use of the streambank and river. In the campground stretches, stream bank erosion from human impacts has caused the river to widen to twice its original natural width. Rafting, swimming, fishing, and jumping from bridges are popular recreational activities in Yosemite Valley. Some erosion of riverbanks, trampling of meadows, and litter can be attributed to rafting use. A history of removing fallen trees from the Merced River for rafter safety and bridge protection has resulted in altered river dynamics and has disrupted aquatic and riparian ecosystems.

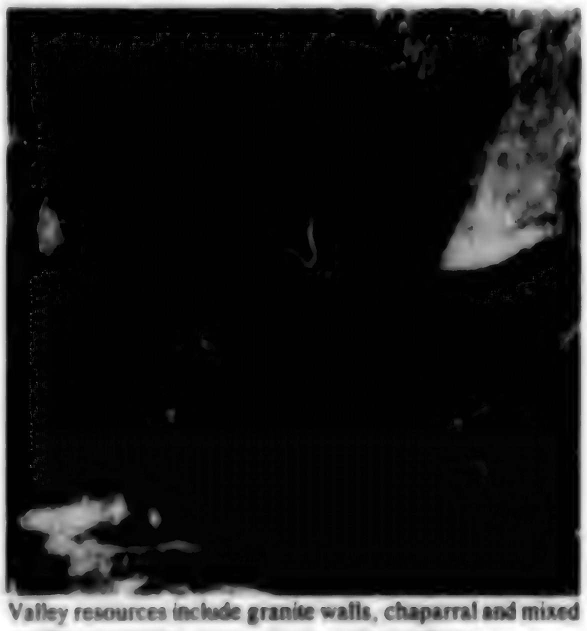
Proposed restoration plans include the removal of structures and revetments, re-contouring of riverbanks, revegetation of riparian areas and restoration of aquatic habitats. As part of project to restore the Merced River, fallen trees will no longer be removed from the river. This policy will help to restore natural conditions, but may also create hazards for river users.

Floodplains and Wetlands. The Merced River has recorded 10 significant winter floods over the known history of the park. The largest floods, in 1937, 1950, and 1955, are estimated to have reached flood heights equal to a 50-year flood event. Flood levels for 100-year floods were calculated and mapped for the valley in 1981 by the Army Corps of Engineers. In the valley, the extent of the 100-year flood would include all of the campgrounds and part of the visitor accommodations at the Yosemite Lodge and the Ahwahnee cottages.

Vegetation. Yosemite Valley is located primarily in the chaparral and mixed conifer vegetation zones (3,000 to 7,000 feet elevation). Meadows exist within both zones.

Natural meadow conditions in the valley have been altered by human use for the past 130 years. Historic uses, including grazing, past management practices, and present visitor use levels and patterns, have degraded meadow areas to unacceptable levels. In Yosemite Valley, where over 800 acres of wet meadows and grasslands existed, only 300 acres remain. All but one, Bridalveil Meadow, have historically been plowed for agricultural uses and planted with domestic pasture grass mixes.

It is the policy of the park to avoid any new disturbance to meadows and to restore disturbed meadow areas where possible. Dry meadows at lower elevations occasionally contain California black oak as a dominant tree species. Great gray owls, a species listed as endangered by the state of California, spend more than 90% of their time in meadows or in the timber strip bordering meadows.



Valley resources include granite walls, chaparral and mixed conifer vegetation zones, rivers, and meadows.

Wildlife. Disruption of wildlife habitat and access to surface waters in the valley occurs because of the removal and destruction of natural meadows and wetlands and the location of park roads along both sides of the river.

Destruction has been caused by construction and informal use of critical environment by park visitors. Familiar food, shelter, and hunting perches are removed, resulting in habitat fragmentation and unnatural isolation of wildlife populations. This has a deleterious effect on genetic diversity and viability. In addition, increased vehicular traffic and informal roadside parking cuts off wildlife access to surface waters, and increases the potential for animal/vehicle conflicts — particularly during spring and fall migrations.

The presence of humans has severely impacted the black bear population in the valley. Impacts are associated with the continued availability of human food in campgrounds, tent cabins, vehicles and back country camp areas, and increasing visitor use.

Mule deer in the valley are managed with the goal of maintaining a population of natural abundance and sex and age composition. However, nearly all of Yosemite's deer population winters outside the park and is influenced by hunting and other land management practices. There is concern that valley deer populations might exceed sustainable levels due to predator/prey imbalances, and a lack of hunting and abundant food sources. Deer behavior patterns, as with black bear, are being altered by visitor presence and by the ready availability of human food sources.

The California spotted owl may be found at Happy Isles in Yosemite Valley. It is classified as a Category 2 candidate for the endangered species list.

Over the past 100 years, Yosemite's lakes and streams have been altered by human use and influence. Streamside plant communities have been trampled, streambanks eroded, and bridges and other structures have interfered with natural stream flows. Since 1963 natural loads of woody debris and trees, so crucial as fish habitat, have been removed from the Merced River throughout the Yosemite Valley in order to protect bridges and provide for rafter safety. A 1991 Fish and Wildlife Services habitat assessment and fishery survey has documented unnatural levels of sedimentation and turbidity in the Merced River as far as 1/2 mile downstream from bridges — a direct result of bridge jumping activities. The shock waves from jumper impacts may also be causing trauma to the fish.

Fish stocking and other management actions are aimed at restoring and protecting natural aquatic ecosystems and providing self-perpetuating populations of aquatic species. Species-targeted fishing regulations (including catch-and-release provisions) and habitat restoration efforts are now used for aquatic ecosystem restoration.

Cultural Resources. The floor of the Yosemite Valley as far west as Wawona Tunnel is listed as an archeological district in the National Register of Historic Places. In a 1992 survey, 100 archaeological sites were identified in the valley.

Historic resources listed on the national register that are adjacent to roads include the Yosemite Valley bridges (Clark's Bridge, Tenaya Bridge, Happy Isles Bridge, Stoneman Bridge, Pohono Bridge, and Yosemite Creek Bridge), the Yosemite Village, and the Camp Curry historic district. The Ahwahnee and Sugarpine bridges in the valley are listed on the national register but are on roads used only by bicycles and emergency vehicles. The Camp Curry footbridge which crosses the Merced River between the Upper River and Lower River campgrounds, is a potential national register property. There also is Civilian Conservation Corps (CCC) rock work, such as retaining walls and culverts, which has not yet been evaluated for national register eligibility.

The majority of the historic bridge structures are causing significant impacts to the natural environment. Old bridge design did not adequately take into consideration the hydrologic requirements of the stream course, especially at peak flows. The results have been severe stream bank erosion above and below the structures, scour holes in the river channel immediately downstream, the formation of unnatural mid-channels immediately downstream, and bars from the scouring action. Removal of the Merced River bridge structures that have been nominated to the National Register of Historic Places could be controversial, but would benefit the river ecosystem.

Because of cultural and religious needs, special use areas, such as sacred sites and ritual locations, must be considered in developing avoidance zones for the development of visitor transportation systems. Many sites might be identified by native people so that these areas can be given special consideration; however, the location of some sites, especially sacred and ceremonial areas, may be privileged knowledge among tribal members. It is critical that Native Americans be consulted during further development of VTS alternatives.

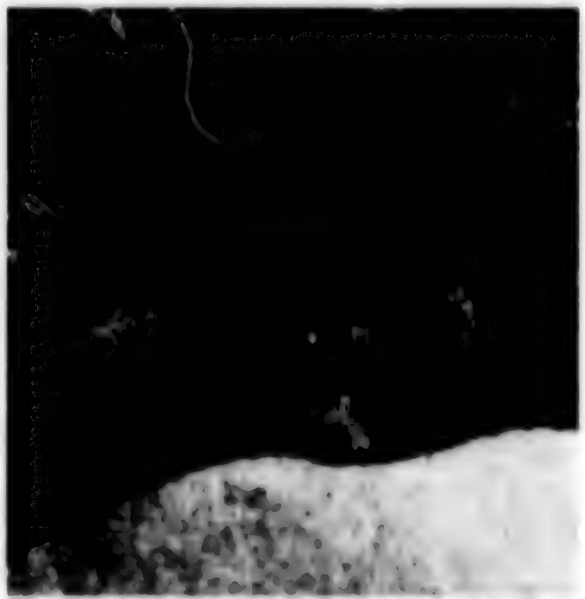
Visual Resources. Three viewpoints are of particular concern in the valley — the view from Glacier Point a view from an overlook about 1/2 mile up the Yosemite Falls trail and the view from the east end of the Wawona Tunnel at Discovery View. As visitors view the valley from Glacier Point, they look directly down on Curry Village. In the middle distance are the stables, the campgrounds, Housekeeping Camp, Ahwahnee Hotel, and Camp 6. Farther away in Yosemite Village, the most evident facilities are the maintenance area, concession warehouse, and visitor center. Yosemite Lodge cannot be seen from the primary overlook.

From the Yosemite Falls trail overlook, visitors look directly down on Yosemite Lodge. Most of the employee housing structures near the lodge are currently screened by surrounding tall trees, with the exception of the tent cabins in the Ozone area. Most of the visitor facilities at the lodge are readily visible. To the east, the maintenance area of Yosemite Village is also evident. The Discovery View vista is unique because the tall forest on the valley floor obscures all evidence of human influence, giving the impression of pristine conditions.

Historic and other scenic vistas have not been maintained and have become overgrown with vegetation in many cases. As a result, visitors have trampled adjacent meadows, woodlands, and riparian areas trying to see the historic scene.

Valley Park Management Issues

The current patterns of visitor use and travel in the valley result in the expenditure of substantial time and money on traffic management and resource protection. On the highest use days, rangers must be stationed at several locations to provide traffic control, including El Capitan crossover, Sentinel Bridge, the Curry four-way intersection, and the village intersection. Traffic flows must be monitored carefully to forestall gridlock conditions in the east end of the valley. Traffic congestion lengthens response times for emergencies in the east end of the valley. Shuttle bus service is also disrupted, resulting in delays to passengers and overcrowding of buses and bus stops.



The view from Glacier Point looks directly down on Curry Village

The present traffic diversion procedure at El Capitan crossover is difficult to implement. The intent of the diversion is to allow visitors with overnight reservations to enter, while turning back day users; however, in practice, it is not possible to distinguish between these groups of users without causing even more severe congestion and safety problems on roads at the west end of the valley. As a result, all users are diverted out of the valley and overnight visitors are obliged to loop back to the valley and try to enter again.

CRITICAL TRANSPORTATION ISSUES

The most significant transportation issues in Yosemite occur in the three high use activity centers at Mariposa Grove, Tuolumne Meadows, and the valley. The issues include:

- Inadequate parking in Mariposa Grove and resultant traffic circulation and congestion problems at the south entrance and at the overflow parking area at Wawona.

- Pedestrian and vehicle conflicts at the shuttle parking area in Wawona. High costs also are incurred for traffic management along the main road in Wawona.

- Visitor confusion in Wawona/Mariposa Grove area due to uncertainty about parking locations and unreliable shuttle service with poor visitor orientation.

- Inadequate private vehicle and tour bus parking in Tuolumne Meadows, resulting in roadside parking, meadow and road-edge damage, pedestrian/vehicle conflicts, excess vehicular circulation, and poor access to the existing shuttle systems.

- Congestion, high vehicle volumes, roadside parking, vehicular conflicts and delays to the valley shuttle near Yosemite Falls in the valley. Inadequate tour bus parking and pedestrian/vehicular conflicts exist at the tour bus parking area near Yosemite Falls. Vehicles dominate in the valley, in conflict with the purpose of the park.

CRITICAL RESOURCE ISSUES

Major visitor use areas and attractions are located within critical resource areas. These issues and areas are summarized below.

- Meadows in Yosemite Valley, Wawona and Tuolumne and their associated wetlands and river corridors. Critical conditions include habitat continuity, condition, and wildlife use. Many existing park roads bisect, surround, or cross these important resources.

- Visual quality of pristine natural settings, geological formations, hydrologic features, and historic structures throughout the park.

- The Merced River through Yosemite Valley, the south fork of the Merced through Wawona, and the Tuolumne River and Meadows represent the most critical non-forest wetland habitats with potential for a high concentration of wildlife species.

- Roadside vegetation and soil conditions in Tuolumne Meadows, Wawona, Mariposa Grove, and Yosemite Valley.

- Extensive archeological and historic cultural resources, including those on or determined eligible for the national register located in Yosemite Valley, adjacent to Tuolumne Meadows, Wawona, and Mariposa Grove.

- The potential effects to air quality from personal vehicle emissions and buses, particularly in Yosemite Valley.

The most critical resources at the major use areas include:

- Wawona.

    - Archeological district and historic resources
    - Meadow and riparian habitat fragmentation
    - Wild and scenic river designation
    - Water quality degradation from erosion and sedimentation

- Mariposa Grove.

    - Damage to giant sequoia trees and associated grove vegetation
    - Soil compaction
    - Archeological district and historic resources

- Tuolumne Meadows.

    - Habitat fragmentation
    - Archaeologic district
    - Wetland habitat disturbance and soil compaction
    - Wild and scenic river designation

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- Yosemite Valley:
  - Meadow and riparian habitat fragmentation
  - Wild and scenic river designation
  - Water quality degradation from erosion and sedimentation
  - Archaeological district and historic resources
  - Foreground visual influences and views from valley rim locations

The major roads in the park create some specific resource impacts, including:

- Park road corridors, particularly in Yosemite Valley, are creating accelerated watershed erosion. They provide direct personal vehicle access that impacts sensitive meadow environments and affects wildlife movements. Road alignments are located through and surrounding sensitive meadows, wetlands, and fragile soils.

- Surface drainage is collected in roadside ditches and concentrated into road culverts, which are often misplaced (not in natural drainages), resulting in gullies with headcuts. Many roadside turnouts have been located improperly, and are not paved to reduce soil compaction, erosion, and sedimentation of the adjacent drainage system.

- Because there are few paved shoulders, the pavement edge often has a sharp drop off, creating a hazardous condition and promoting continued road damage. There are turnouts to encourage slow vehicles to pull over; however, many of the existing turnouts have abrupt pavement edges.

OTHER PLANNING STUDIES

This project has incorporated the major recommendations and conclusions of many previous plans and studies that identified various approaches and strategies for mitigating the effects of present levels of vehicular impacts within the park. These approaches sought to reduce the impact of visitor transportation by capturing specific trips at outlying locations, and/or limiting visitor use levels at major attractions. These documents also provided important parkwide and environmental information on which to base subsequent project planning. Plans and studies utilized, included:

- *1980 Yosemite National Park General Management Plan*. Provided daily visitor use levels in activity areas, overnight camping accommodations, short- and long-term park operations and management direction, and specific park projects as a basis for transportation planning. NPS, 1980.

- *El Portal/Yosemite Valley Comprehensive Design*. Provided background on previously studied VTS and staging area alternatives. NPS, 1987.

- *Yosemite National Park Concessions Services Plan*. Provided proposed park lodging and visitor concessions services information to supplement the general management plan, as a basis for transportation planning. NPS, 1991.

- *Mariposa/South Entrance Draft Development Concept Plan*. Provided resource management and visitor experience enhancement information coincident with the general management plan, as a basis for transportation planning. NPS, 1987.

- *Yosemite National Park Draft Resource Management Plan*. Provided parkwide environmental background and resource management plan and implementation information as a basis for transportation planning. NPS, 1992.

- *Yosemite Transportation Planning Study*. Provided alternative parkwide transportation strategies, including staging area options and VTS services for the valley, as a basis for transportation planning. FHWA, 1982.

- *Yosemite Transportation Study*. Provided background on existing Yosemite road system conditions. Leigh, Scott & Cleary, Inc., 1991.

- *Yosemite Transportation Strategy*. Provided recent concepts for remote staging areas and

Valley VTS service. Provided parking data, visitation summaries, and other data as a basis for transportation planning. Wilderness Society, 1992.

- *Yosemite Sign Study*. Provided concepts for alternate traffic circulation plans and signing plans to manage and direct vehicle flows within Yosemite Valley. Meeker & Associates, 1992.

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ALTERNATIVES DEVELOPMENT AND SCREENING

Transportation system alternatives were developed to address the following functional requirements in Yosemite National Park:

- Access to the Mariposa Grove
- Circulation in Tuolumne Meadows and access to high-use activity areas along the Tioga Road west of Tuolumne
- Access to Yosemite Valley
- Circulation in Yosemite Valley

The needs of day use visitors, campers, backcountry users, and lodging guests were considered in the development and evaluation of the alternatives. The improvements considered included relocation and expansion of parking facilities, reduction of traffic conflicts and resource damage through facility relocations and minor roadway improvements, remote staging areas serving activity centers, enhanced VTS bus services, and the implementation of at-grade and elevated fixed-guideway transit systems.

A two-stage evaluation process was used to identify feasible alternatives. First, a wide range of potential transportation improvements were developed. These alternatives were subjected to an initial screening process to identify those options with clearly less desirable performance. A more limited number of options were selected for quantitative assessment and comparison.

No recommendations were made concerning the development of specific transportation improvements. More detailed analysis of engineering, environmental, and visitor-use issues would be required to determine the alternatives that best meet the unique needs of Yosemite. The conclusions of the evaluation presented in this report are intended to assist in the definition of a small number of potentially cost-effective transportation measures, and to identify the issues that should be explored in more depth before final decisions are made.

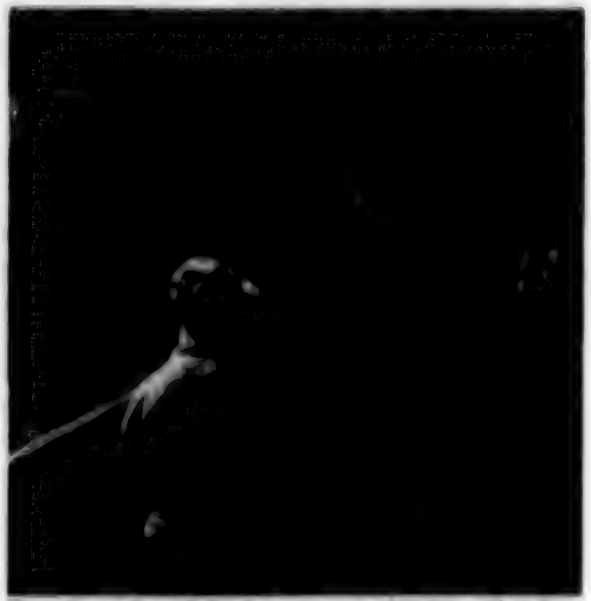
CRITERIA FOR DEVELOPMENT AND EVALUATION OF ALTERNATIVES

A set of criteria were prepared to guide the development of transportation system alternatives, to focus the initial screening of alternatives to a smaller set of feasible options, and to direct the comparison of the feasible alternatives for Yosemite. The criteria were developed to respond to the study purpose and to account for the unique transportation problems and environmental conditions at Yosemite.

Essential Requirements

To be considered for detailed evaluation, transportation improvement alternatives for Yosemite were required to have the following essential characteristics:

- Be able to accommodate GMP visitation levels in all areas.
- Allow visitation to be managed to achieve GMP visitation levels.
- Afford a meaningful reduction in private vehicle travel.
- Allow current visitor-use patterns to continue, including the ability to conveniently visit more than one area of the park in a one-day visit, allow trips through the park to be made by entering and exiting through different stations, and allow visitors to experience a full range of scenic and wilderness-oriented activities.
- Reduce vehicle-related emissions.
- Reduce energy consumption associated with transportation.
- Maintain visual quality in key areas, especially the pristine view across the west end of the valley from Discovery View and the view into the valley from Glacier Point.


Tour buses have helped to manage visitation and reduce private vehicle travel.

- Employ proven, available technologies for visitor transportation systems.
- Be capable of operating in a safe manner in the Yosemite environment.
- Comply with all federal, state, and local requirements for accessibility.
- Allow unrestricted movement of wildlife across and along the transportation system.

Finally, the alternatives had to represent potentially cost-effective solutions to transportation problems and resource impact concerns, considering the magnitude of the problems and the level of investment required.

The evaluation of these alternatives that met the essential requirements was organized into the following major topics.

Visitor Transportation and Management

This evaluation category included measures of the convenience of the alternatives to visitors measured by travel time, waiting time, the number and reliability of transfers required, and ease of use. Each alternative was assessed for its ability to serve observed travel demand patterns and evaluated for the quality of visitor access. For remote staging area options, the assessment of visitor convenience included the impact of the alternatives on visitor trips through the park and trips to other activity areas within Yosemite. Other important considerations in this category included the safety of VTS routes, the ease of accommodating luggage and equipment, and the potential for lost luggage and other complications. The evaluation also addressed the contribution of the alternatives to the achievement of Yosemite's visitor management goals. Comparability between resource and facility carrying capacity and the transportation capacity of the alternatives was considered.

Visitor Experience

The alternatives were compared with respect to the visitor experience and passenger comfort offered. This category included noise, crowding, and visual disruption. The ability of the alternatives to enhance the natural and wilderness character of the park by blending into the surroundings and by reducing the influence of automobiles was considered. These criteria included the impact of the transportation system on views and vistas from points adjacent to the alignment and from key viewpoints. Alternatives that addressed overcrowding and delays due to traffic congestion received positive values for visitor experience.

Resource Impacts

The primary basis for comparing the impact of alternatives included changes in vehicle miles traveled, changes in emissions (using relative comparisons, rather than absolute calculations), and changes in the location and size of parking facilities. The potential to restore areas to natural conditions and contributions to improved water quality by removal of bridges and facilities adjacent to streams were evaluated. The construction impacts of alternatives, including noise, vehicular activity, staging area needs, and material requirements were also considered. Alternatives that would provide visitor access and facilities in previously undisturbed areas within the park were carefully evaluated with respect to resource impacts.

Consistency with Planning Goals

Alternatives were assessed for their consistency with park, gateway community, and regional goals. The need for cooperative action from other agencies and potential impacts to private property were evaluated. The consistency of the alternatives with park goals was also considered.

Cost and Cost Effectiveness

Construction, equipment, operation, and maintenance costs were estimated for each of the final alternatives. These costs were compared to visitor volumes to assess the cost-effectiveness of each option. The potential of each alternative to attract funding from sources outside the National Park Service also was considered. The capital cost estimates developed in this report reflect total project costs including supervision, contingencies, planning, and design.

Implementation

The impacts of alternatives on park management, employee housing, and off-site conditions were evaluated. Special implementation requirements, such as environmental compliance activities and wilderness management exemptions, were also assessed. The ability to stage improvements while maintaining visitor access was evaluated.

INITIAL TRANSPORTATION ALTERNATIVES

A wide range of visitor transportation concepts have been developed through NPS-sponsored planning efforts, advocacy group studies, and development efforts of private entrepreneurs. Some of these concepts attempt to eliminate all vehicular traffic from the park, while others address problems only in Yosemite Valley. Vehicle trip purposes considered for restricted use range from day users only, to all travelers — including campers. Finally, the geographic scope of the alternatives varied widely. Strategies to reduce private vehicular traffic in Yosemite Valley have included staging areas as far away as Mid Pines (36 miles from Yosemite Valley) and as close as the Sentinel Beach/Yellow Pine area east of El Capitan meadow.

The identification of viable transportation alternatives was completed in a series of steps, beginning with the identification of areas where visitor transportation systems might be cost effective and feasible. The second step was to select the visitor types and trip purposes that could be served by VTS alternatives. One aspect of this step was to determine whether visitors arriving in the park by tour bus should be served by the visitor transportation system or allowed to remain on their buses. Finally, the geographic scope of specific alternatives was defined to best serve the areas and trip purposes identified as candidates for travel by visitor transportation systems.

Several factors had a major influence on the development of alternatives:

- The relatively good traffic conditions along the park roadway system.
- Visitor use limits established in the general management plan, which define the degree to which peak day visitation can increase in the future.
- The proportion of visitors traveling to Yosemite as part of a larger vacation trip (over 60%).
- The estimated number of trips entering the park through one gate and leaving through another (57%).
- The large proportion of visitors bound for the valley (over 70%).
- The high costs in labor and equipment associated with capturing visitors at points far removed from their destinations.
- The difficulty, expense, and visitor inconvenience associated with transferring camping equipment and luggage to VTS vehicles.
- Complications associated with sorting traffic by destination, day versus overnight use, and reservation status.

- The disproportionate share of traffic to and from the valley generated by day use visitors (77%).

- The tight curves and steep grades of the roads approaching the park.

Locations for VTS Service

Based on the location of identified transportation problems, the very high costs of providing long-distance VTS service, and the clear advantages to visitors of private vehicle travel as a means of long-distance movement in the park, it was determined that parkwide visitor transportation systems should not be considered. Transportation systems that attempted to serve all park travel would be prohibitively expensive, would prevent the convenient use of the park by travelers making through trips, would reduce the ability of visitors to enjoy much of the park on an individual basis, and would not be cost-effective.

The further development of alternatives focussed on the high activity areas of the park, where congestion and parking problems now occur an a regular basis. The areas with the highest visitation levels are Mariposa Grove, Tuolumne Meadows, Yosemite Valley, and Glacier Point. Of these, all but Glacier Point now have free NPS-managed VTS alternatives available for visitor travel.

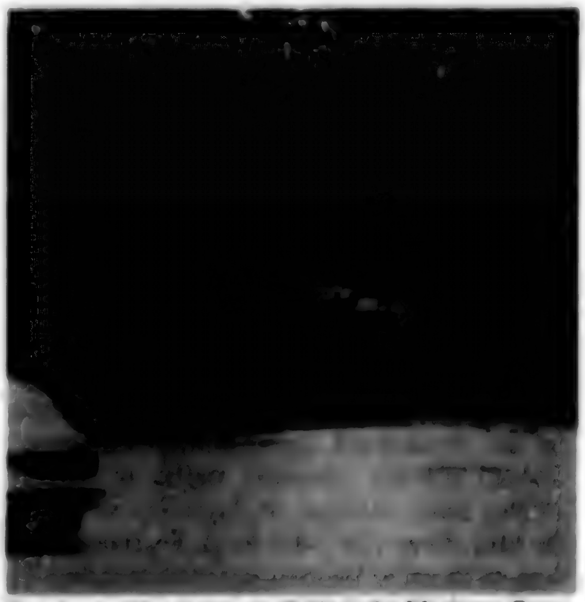
The possibility of providing VTS access to Glacier Point was considered in light of the capacity of the existing parking area, the carrying capacity of the viewpoint (considering crowding), and the curves and grades along the last mile of Glacier Point Road. The parking area provides space for 194 private vehicles and 5 buses. When fully occupied, the lot provides parking for over 750 visitors. The viewpoint area and trails begin to feel crowded before the parking lot fills, indicating that no additional parking capacity should be provided. The average visitor probably spends one 1/2 hour at most at the point; as a result, the hourly visitation capacity of the parking area is about 1,500 people, including the bus stalls.

Using typical use patterns from other NPS attractions, the daily visitation capacity of the Glacier Point parking area was estimated to be 10,714. This is above the 7,650 visitors per day prescribed in the general management plan.

Traffic volumes on Glacier Point road average 1,300 each way per day. This volume is well below the capacity of the road and the parking area at Glacier Point, resulting in daily visitation well below the prescribed GMP level. Traffic congestion, when it occurs, is brief. The road alignment is not well-suited to bus travel, although many concessioner and tour buses make their way down the step grade and through the switchback curves into the parking area. Buses are noisy on the steep uphill climb from the parking area. Serving the GMP visitation level would require between 20 and 30 bus trips per hour to the point. To serve the current average seasonal daily demand, 116 daily bus trips and 16 trips per hour during the majority of the day would be required.

The cost of the operation would be substantial, noise and exhaust levels would be unpleasant for visitors, and NPS resources would be diverted from areas which have more serious traffic and parking problems. As a result, Glacier Point was not considered as a location for VTS service at this time.

The final areas selected for evaluation of VTS concepts were Mariposa Grove, Tuolumne Meadows, and Yosemite Valley. The next step



Tour bus parking is now available in the Mariposa Grove.

in the alternatives development process was to identify the visitor types and trip purposes to be served by the transportation systems in each area.

Visitor Type and Trip Purpose

In Yosemite, two visitor patterns are significant — overnight and day use.

Mariposa Grove is used exclusively by day users. Access to the area from Wawona Road is a concern. Circulation within the grove is on foot or by concessioner-operated trams. If a transportation system was provided for access to the grove, it would likely use buses powered by internal combustion engines. The grades in the area make the use of battery-powered buses infeasible, and passenger volumes do not warrant fixed guideway solutions. As a result, there would be no advantage to displacing tour bus passengers from their vehicles. Tour bus parking is now available in the grove. If it becomes desirable to remove this parking, or if it proves to be inadequate for future demand, the buses could drop their passengers at the grove and then park in a remote staging area until the scheduled departure time.

Tuolumne Meadows is used by overnight guests at the small tent cabin lodge, by users of the large campground, by backcountry travelers accessing the high Sierra from the many trailheads in the area, and by day users who stop on trans-Sierra trips or make day trips to the area for climbing, hiking, and other outdoor pursuits. Access to the area is provided by the Tioga Road, a well traveled but uncongested route connecting the Tioga Pass entrance on the east edge of the park with Crane Flat in the west. The Tuolumne Meadows area is the most remote major activity area in the park, located some 55 miles from the valley. The trip purposes of concern in this area are circulation between the various activity areas and access from the developed area to the trailheads and viewpoints located along the Tioga Road. These trips are made difficult by shortages of parking at the scattered activity sites and in the meadow area. The primary need is to consolidate and expand parking in a location that will reduce resource damage and improve accessibility.

Tour bus parking is a major problem in Tuolumne Meadows. None of the activity areas or existing parking facilities was designed to accommodate tour buses. A consolidated and expanded parking area should act as a staging point for both private vehicle travelers and tour bus passengers. Adequate tour bus parking should be provided to allow the tour passengers to circulate through the area on the visitor transportation system, returning to their tour buses after an average stay of one to four hours.

Yosemite Valley presents the greatest transportation challenge in the park. No other area in the national park system has received more transportation study. The general management plan established valley visitation at 10,530 day use visitors and 7,711 overnight visitors. In addition, a daily quota of 145 backcountry user permits are allocated to the trailheads in the valley for trips into the wilderness. These users generate a total of over 8,000 vehicle trips per day for the purpose of entering and leaving the valley. Overnight visitors who use their private vehicles to travel to other parts of the park add to the total trips entering and leaving the valley. Once in the valley, visitors make numerous trips between the various activity areas and prime viewing sites. Both the access and circulation trips of valley visitors are of primary concern.

Tuolumne Meadows is lacking designated parking for shuttle bus users.

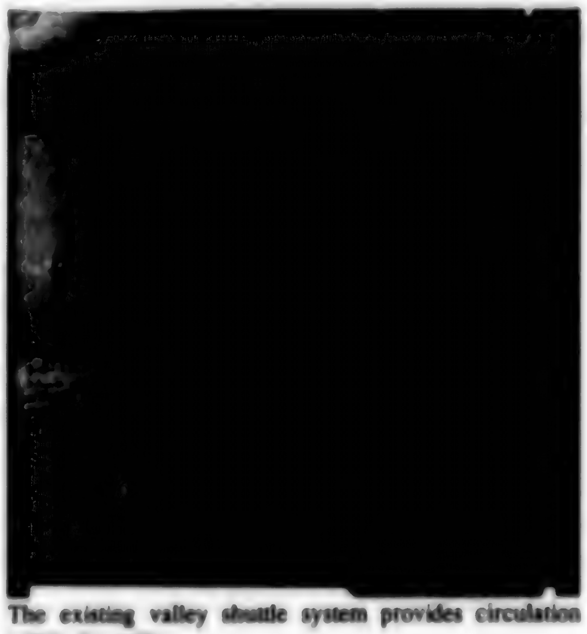
Of all trips into the valley, 77% are made by day users. The access trips, most now made by private vehicle, are a prime candidate for diversion to a visitor transportation system. They consist of dead-end trips that pass the same point entering and leaving the valley. They could be served without significant delay or diversion by a visitor transportation system. Day users arriving by bus could be captured on the visitor transportation system at a point outside the developed area of the valley, or buses could be allowed to travel into the valley and stop at a central location. Tour bus visitors, arriving in large groups, would tend to disrupt the operation of a valley shuttle system, since the capacity of a tour bus is between 50 and 100% of the capacity of potential shuttle vehicles. At this level of analysis, it appears that the costs and drawbacks of capturing tour bus riders outweigh the potential noise and vehicle trip reduction benefits.

Of the 1,800 vehicle trips into and out of the valley made by overnight visitors, 42% are made by those staying in hotels. The primary advantage of capturing hotel visitor trips would be the reduction of parking needs in the valley by about 1,000 vehicles, or 25%. Most of the parking spaces are located within the developed areas of the lodges and have little detrimental impact to visitor experience or the environment of the park. It is conceivable that these trips could be intercepted by a visitor transportation system, but the cost of luggage handling, the confusion, and the visitor resistance associated with capturing these trips would be out of proportion to the benefits. If intercepting day use visitors proves to be successful, future plans could be made to expand the capacity of the visitor transportation system to accommodate hotel guest trips. As with hotel guests arriving by private vehicle, those arriving by tour bus would be best served by allowing buses to travel directly to the lodging areas. Overnight bus parking could be provided in a remote location, if desired.

The most difficult access trips to capture on a visitor transportation system are made by campers. In many cases, the vehicle used by campers serves as housing at the campsite. Even for tent campers, providing for the transfer of gear would be difficult, inconvenient for the visitor, costly in labor and equipment, and could expose the operator to loss claims for damage to equipment. Parking spaces for camping vehicles are an integral part of the campsite. Their removal would not free up any area for restoration to natural conditions and would do little to improve the visual character of the valley.

Considering the benefits, complexities, and costs of serving the access trips of the various types of visitors to Yosemite Valley, the decision was made to serve only the access trips of day use visitors with VTS options.

Visitor circulation trips are a significant additional component of travel in the valley. On peak days, the valley shuttle system now serves 26,000 person trips. If made by private vehicle, these trips would result in an additional 9,000 vehicle trips per day. Although the valley shuttle is an effective alternative to private vehicle travel, many auto trips are still made within the valley. A primary objective of an enhanced visitor transportation system should be to serve most of these auto trips to further reduce congestion and travel in the developed part of the valley. Capturing day use travelers at a staging area outside the developed area would automatically remove all day use circulation trips from the valley's roads. Diverting overnight



The existing valley shuttle system provides circulation within the valley.

visitor's internal valley trips to a transportation system can be accomplished in a number of ways.

It would be difficult to prevent overnight visitors from driving their vehicles in the valley. Enforcement systems would be complex, inefficient, and probably ineffective in distinguishing vehicles making trips in and out of the valley from those made between valley destinations. The most effective means of controlling private vehicle use are the provision of high quality VTS service, the elimination of parking outside of the lodging and camping areas (perhaps excepting disabled parking spaces), and the provision of clear information to visitors explaining how to use the visitor transportation system and emphasizing that visitor parking is not available in the activity areas. Parking spaces could be provided for campers needing supplies at valley stores, with time limits or parking meters used to discourage long-term parking.

In summary, the visitor and trip types which are most appropriate to consider in planning VTS service in Yosemite are:

- Day use access trips to Mariposa Grove. Tour bus trips would not be intercepted.
- Circulation trips by day and overnight users in Tuolumne Meadows and access trips by day users and backpackers to points along the Tioga Road. Tour buses would be intercepted at a staging area and tour bus passengers would use the visitor transportation system to visit features in the area.
- Access trips by day users to Yosemite Valley and circulation trips within the valley by day users and overnight visitors. Access trips by bus passengers would not be intercepted.

Staging Area Locations and VTS Routes

Successful VTS services in parks depend on conveniently located, adequately sized parking facilities. The most troublesome aspect of the shuttle systems now operating to the grove and in Tuolumne Meadows is a lack of parking for shuttle passengers.

In areas of short-term visitor use, it is vital that parking to support a shuttle service to the area be located as close as possible to the attraction. Distant staging areas result in long delays to visitors, higher capital and operating costs due to increased fleet requirements, and an increase in the number of required parking spaces due to lengthened stays in the staging area lot. Table 7 illustrates these points.

Mariposa Grove. Proximity to the activity area is especially important at Mariposa Grove. The average stay for visitors to the grove was found to range from 60 to 80 minutes. A staging area located within 20 minutes travel time by bus would result in an overall increase in required parking of about 50%. No areas further than 20 minutes from the grove were considered feasible. Based on input from Yosemite National Park staff, two sites were identified for detailed analysis — the Wawona area and a winter play area known as Goat Meadow just south of the park boundary. These locations are illustrated on the Mariposa Grove Access Alternatives map on page 140.

Tuolumne Meadows. Less is known about visitor use patterns in Tuolumne Meadows than in the other activity areas. Stay lengths for day use visitors are highly variable, depending on the activities they undertake. In order to serve all users well, a staging area site close to the main activity area is desirable; however, the meadows area offers no opportunities for an adequately sized facility without unacceptable resource impacts to wetlands, fragile meadow habitat, and views. A former gravel pit, located about two miles east of the lodge access road, offers a potentially good staging area, adequate space to relocate visitor support facilities, and the opportunity to provide improved visitor orientation and interpretation.

Since a substantial number of visitors to the meadows arrive from the west, a site on the far east end of the area would cause additional travel for a number of visitors. A second staging area site on the west end of the activity area

Table 7: Parking and Shuttle Needs for Remote Staging Areas

Staging Area Location	Total Stay (min)	Parking Spaces Needed	Bus Fleet Needed
At Attraction	30	50	0
5 Minutes from Attraction	40	67	2
10 Minutes from Attraction	50	83	4
15 Minutes from Attraction	60	100	5

Source: BRW, Inc.

Note: Assumes 300 visitors per hour, 3.0 visitors per car, 30-passenger bus, 30 minute stay at attraction

would provide better access and would reduce the peak loads on a transportation system serving the area, but no appropriate sites could be located in the sensitive subalpine environment along Tioga Road. As a result, a single staging area location was carried forward for the Tuolumne Meadows area. The proposed staging area is illustrated on the Tuolumne Meadows/Tioga Road Staging Area Options map.

Yosemite Valley. Numerous staging area options have been identified in previous Yosemite Valley transportation studies. Remote sites have been suggested in the following areas:

- Wawona Road Corridor - Badger Pass, Yosemite West, Wawona, and Fish Camp
- Arch Rock Entrance Road Corridor and California Highway 140 - El Portal, Mid Pines
- Big Oak Flat Road Corridor - Crane Flat, Big Oak Flat, and North Gate

Past studies have recommended remote staging sites as single facilities and, more commonly, in groups serving each of the major travel corridors leading to the valley. A single remote staging area site would have serious drawbacks. The best site for a single valley staging area would be El Portal, some 15 miles from the valley visitor center. Visitors traveling along California Highway 140 from the west could be conveniently intercepted at El Portal. Vehicles entering the park at Tioga Pass and Big Oak Flat would be diverted 9 miles to the west after entering the valley to reach an El Portal staging area. Trips entering the area from the south would be diverted approximately 13.5 miles, including 3.5 miles of circulation in the west end of the valley. Well over half of the visitors would be inconvenienced, and substantial amounts of extra private vehicle travel would be generated. Travelers from the north, east, and south would drive more miles in the park to use an El Portal staging area than if they entered the valley directly. The net effect would be an increase in vehicle emissions due to more vehicular travel and added emissions from buses traveling between the staging area and the valley.

Multiple staging areas would work best if located so as to directly intercept traffic on each of the four main park roads. An increasing share of park entries and exits are being made at Tioga Pass. A 1993 visitor survey showed that 53% of the visitors leaving through the Tioga Pass station had visited Yosemite Valley. Alternatives that locate staging areas outside the park boundaries on the north, west, and south would cause lengthy diversions of Tioga Road trips bound for the valley and extra vehicular travel due to backtracking.

In proposing remote valley staging area sites, the lower costs, improved visitor convenience, and reduced parking area for sites close to the valley were weighed against the desire to avoid development within the park boundaries and to reduce private vehicle travel along park roads as much as possible. The degree to which a remote staging area actually leads to a reduction in private vehicle miles traveled (VMT) in the park is a function of overall visitor use and travel patterns. If many valley visitors also visit other areas of the park or enter the park at one gate and leave at another, remote staging areas will be less effective in reducing VMT.

Figure 36 illustrates the travel patterns of visitors using a remote staging area to enter the valley. In Case 1 the visitor enters and exits the park by a single station and does not travel to other areas in the park. The shuttle bus trip to the valley replaces private vehicle travel equal to the round trip length of the shuttle bus connection. Assuming the shuttle bus carries an average of 40 passengers and autos have an average occupancy of 2.9 people, vehicular travel along the shuttle route is reduced by 92.5%. In Case 2, the visitor travels to the staging area, parks and rides the shuttle bus to and from the valley. The visitor then continues his trip by retracing the bus route to the valley in order to make a connection with one of the other park roads. The vehicular travel of this visitor has not been changed and a bus trip was required to provide access to the valley along the same route traveled by the visitor in his or her vehicle. Making the same assumptions regarding vehicle and shuttle bus occupancy, an increase in vehicle travel of 7.3% results from implementing a remote staging area for this travel pattern.

Figure 37 shows the primary travel patterns of visitors to the valley. Only 37% of valley visitors do not travel to at least one other major attraction. Nearly 80% of the valley's visitors visit multiple areas in Yosemite or enter and exit the park through different stations. As a result, staging areas remote from the valley offer little potential to reduce private vehicle travel unless visitor use patterns change dramatically.

Remote staging areas would substantially increase fleet requirements for shuttle buses and create the need for much larger parking areas. For example, a Fish Camp staging area would increase the average stay for a visitor approaching the valley from the south by over 50%. If a visitor using a Fish Camp staging area wanted to travel to destinations north of Yosemite Valley, the two-hour round trip bus ride would be duplicated by a private vehicle trip along the same route.

Two alternative remote staging area plans were developed to represent the range of potential options for capturing valley visitors at locations distant from the valley. One plan located staging areas outside the park near the south entrance station, in El Portal near the west entrance station, and near the north (Big Oak Flat) entrance station. Travelers to the valley from the east entrance (Tioga Pass) would be directed to the north staging area.

The second plan located staging areas within the park at Badger Pass and Crane Flat and outside the west entrance in El Portal. The Crane Flat staging area would serve Tioga Pass traffic bound for the valley. The two remote staging area concepts are illustrated on the Potential Remote Valley Staging Areas map on page 126.

The remote staging area concepts were compared to a staging area located in Yosemite Valley. Locating staging areas in remote locations would influence the following quantifiable aspects of visitor use and park management:

- Parking demand. The time required to travel to and from the valley on buses would lengthen the time visitors spend making a visit to the valley and would result in a need for additional parking spaces.

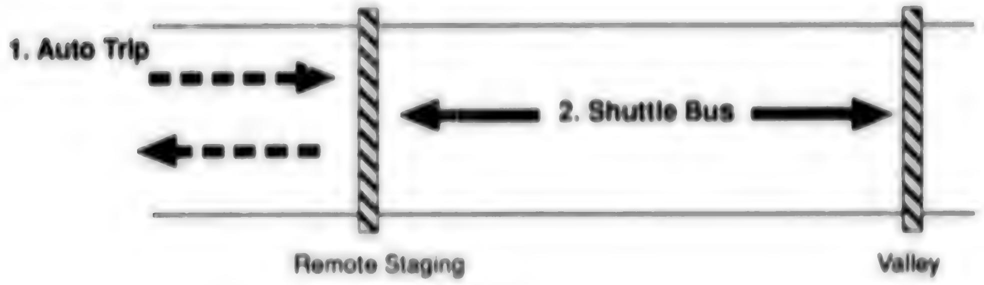
- Shuttle system fleet. More distant staging areas would require larger bus fleets to transport valley visitors to and from the staging area.

- Shuttle system operating costs. Larger fleets and longer travel distances required for remote staging would require greater levels of funding for operations.

Figure 36: Yosemite National Park

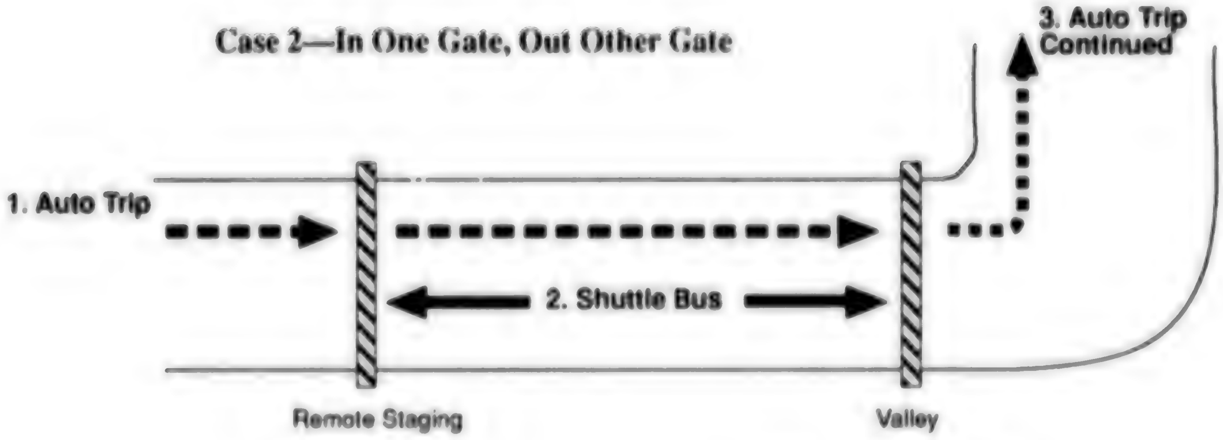
Travel Pattern Impacts on Remote Valley Staging

Case 1—In and Out Same Gate



Vehicle miles traveled: -92.7%

Case 2—In One Gate, Out Other Gate



Vehicle miles traveled: +7.3%

Assumes:
Shuttle bus—40 passengers
Autos—2.9 passengers

Figure 37: Yosemite National Park
Visitor Travel Patterns

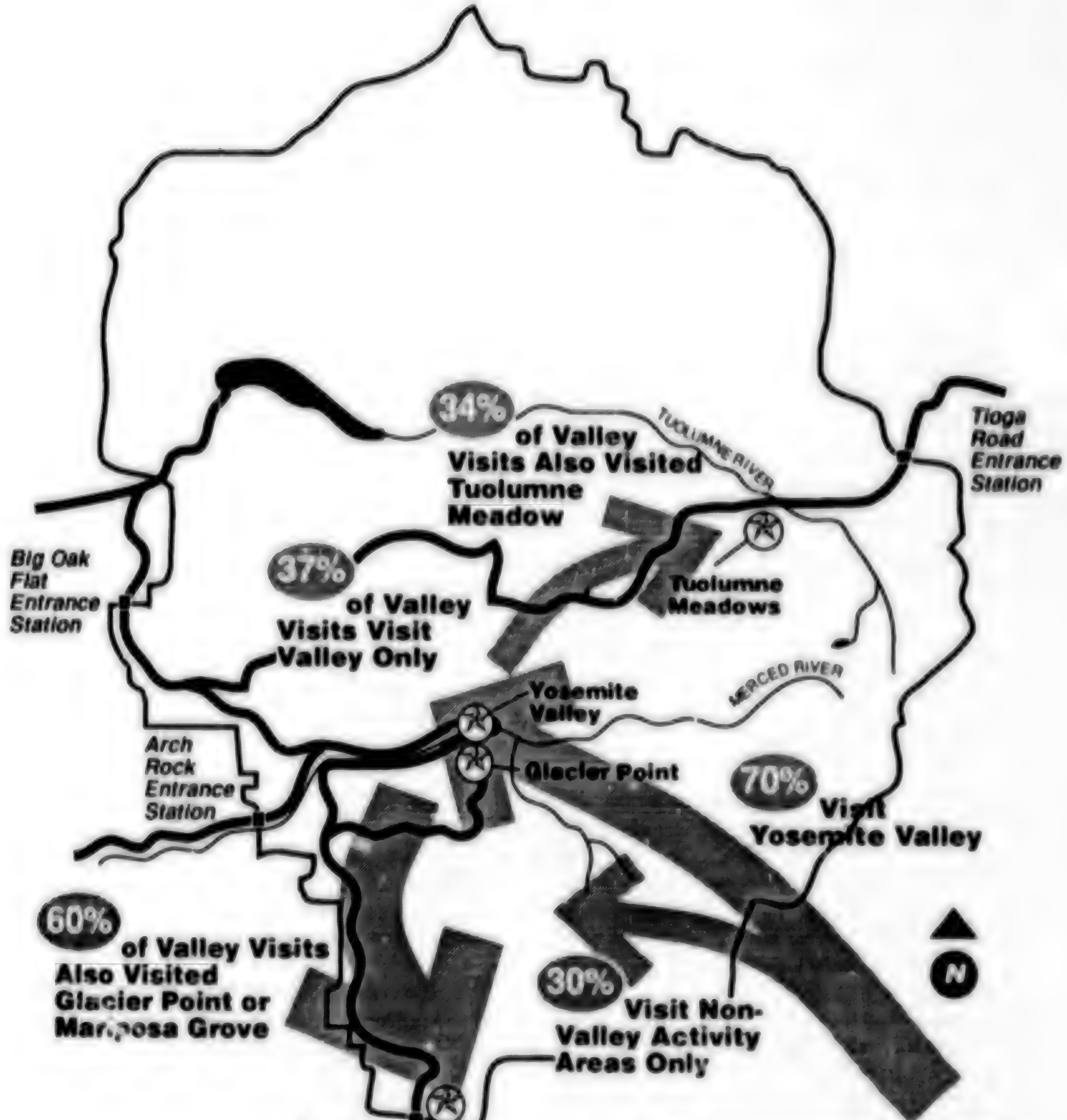

34%
of Valley Visits Also Visited Tuolumne Meadow
TUOLUMNE RIVER
Tioga Road Entrance Station
Big Oak Flat Entrance Station
37%
of Valley Visits Visit Valley Only
Tuolumne Meadows
MERCED RIVER
Yosemite Valley
Arch Rock Entrance Station
Glacier Point
70%
Visit Yosemite Valley
60%
of Valley Visits Also Visited Glacier Point or Mariposa Grove
N
30%
Visit Non-Valley Activity Areas Only
South Entrance Station
Mariposa Grove
3,258 Vehicle Sample Size
100%

Table 8: Comparison of Remote and In-Valley Staging Areas for Yosemite Valley Access

Comparative Measure	Staging Areas Outside Park	Remote In Park Staging Areas	Taft Toe Staging Area
Number of Parking Spaces	2,720	2,470	1,840
Number of Buses Required	83	61	21
Construction and Equipment Cost	$27,337,000	$21,692,000	$10,864,000
Annual Operating and Maintenance Cost	$21,639,000	$15,190,000	$3,158,000
Average Delay to Through Travelers	2 hrs. 12 min.	1 hr. 37 min.	23 min.

Source: BRW, Inc.

Note: Accommodates day use only. Costs represent total costs (contingency, planning and supervision percentages applied where appropriate) for vehicle fleet and parking spaces only. Does not include valley circulator visitor transportation system.

- Delays to through visitors. Visitors traveling to the valley as part of longer trips which involve stops in other areas of the park or which involve entering Yosemite at one location and leaving from another would be inconvenienced by the need to travel to and from the valley by bus and then travel much of the same route in a private vehicle to complete their park visit.

Table 8 provides a summary of the comparison between the remote staging area alternatives and an in-valley staging area. The in-valley staging area was assumed to be located at Taft Toe for this comparison. The remote staging concept would require between 7 and 10 additional acres for parking development, 40 to 62 additional buses, $10.8 to $16.5 million additional construction and equipment costs and $12.0 to $18.5 million additional operating costs per year. The total cost increase for remote staging compared to in-valley staging ranges from $13.2 million to $20.2 million on an annualized basis.

Other considerations favoring an in-valley staging area strategy include:

- Remote staging areas would limit visitors' ability to stop at features along the park roads for sightseeing and other activities.

- Potentially higher levels of particulate and nitrogen oxide (NOx) emissions would be generated by high volumes of bus travel on park roads.[6]

- Increased noise levels on park roads and in the valley would be associated with high volumes of bus travel.

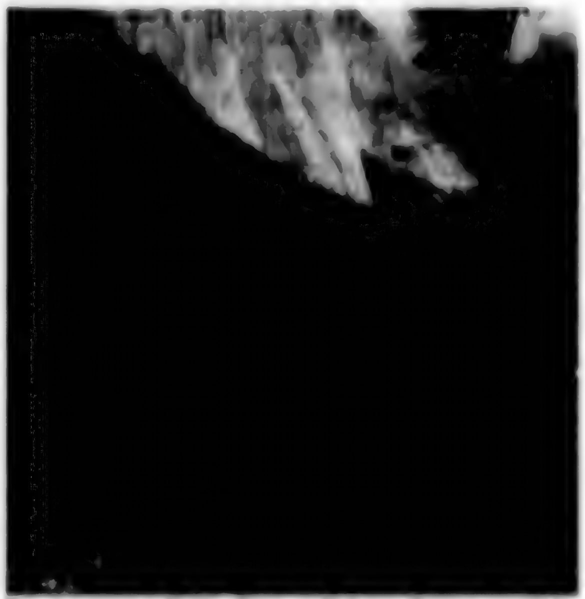
Remote staging areas would present significant management challenges. The following types of traffic would need to be sorted at a staging area:

- Day use visitors to Yosemite Valley would be diverted into the staging area and would travel to the valley aboard a bus.

- Overnight visitors to Yosemite Valley could drive into the valley. Facilities provided at the staging area could allow visitors to confirm their reservations. Information on stand-by lodging and camping should be available, so that visitors could determine if they will be day users or overnight visitors.

- Visitors traveling to other locations in the park.

Complex signage would be required to direct visitors to the appropriate areas within the staging facility or to continue on to destinations outside the valley. Much of this information and management infrastructure would need to be provided at the roadway entrances to the valley as well, to prevent day users from traveling into the valley and to confirm the reservations of overnight visitors prior to entering the valley roadway system. The cost, visitor confusion, visitor delay, information challenges, and management difficulties associated with operating remote valley staging areas would be substantial. In return, the benefits would be minor, consisting of moderate decreases in vehicle traffic along sections of park road that are not congested. Perhaps the greatest drawback of remote staging would be the loss of visitors' personal freedom to experience portions of Yosemite at their own pace and in their own way. Because of the serious drawbacks of remote staging for valley access, the VTS alternatives carried forward for detailed evaluation are based on a staging area located in the valley.



Development at Valley View or Pohono Quarry would be directly visible from Discovery View.

Over the years, several staging area alternatives have been suggested within the valley. These are illustrated on the Yosemite Valley Staging Options map. The sites include areas recommended in previous studies and options suggested by Yosemite park staff. Each site was assessed for performance problems and undesirable attributes that are discussed below.

Pohono Quarry. This site is an abandoned gravel pit that is located just west of Pohono Bridge on the north side of the Arch Rock entrance road. The area was indicated by Yosemite staff as an open space at the far west end of the valley that has been previously disturbed. The site is between the Big Oak Flat Road intersection and the west junction of the two valley loop roads. It also lies within the designated Merced scenic river corridor. Development at this site could cause runoff and resulting water quality degradation. Extensive grading would be required to provide adequate area for a major parking facility, and it would not be possible to reach from the Wawona Road without traveling into the valley to the El Capitan crossover and doubling back, unless the roadway between the El Portal road and the Wawona Road was expanded to four lanes. A major intersection would also be needed to provide for vehicular access and traffic management. Limited area is available for the required intersection and roadway improvements. The parking facility would be directly visible from Discovery View and would significantly affect the existing undisturbed view.

Valley View. This location was recommended in *Yosemite Transportation Strategy*[7] as the site for a transfer facility between shuttles from remote staging areas and a valley shuttle system. The site is constrained by the Pohono Bridge, Northside Drive and the Merced River. The area is within the designated Merced scenic river corridor. Development at this site could cause degradation of water quality from runoff. This site would not provide adequate area for a major parking facility, and it would not be possible to reach from the Wawona Road without traveling into the valley to the El Capitan crossover and doubling back, unless the roadway between the

El Portal road and the Wawona Road was expanded to four lanes. A major problem for this site is its impact on the view from Discovery View. Even as a shuttle-to-shuttle transfer point and overnight visitor entrance station, a large area would need to be cleared for bus staging and visitor check-in.

Site West of Bridalveil Falls. The intersection of the Wawona Road and the Arch Rock entrance road can be reached by all inbound valley traffic without backtracking. It was suggested as a staging area site in the draft environmental impact statement for the general management plan in 1978. The final plan recommended remote valley staging areas. Exiting traffic bound for the north or west would have to travel east to the El Capitan crossover and circle back to the valley's west end unless the segment of the Southside Drive from Pohono Bridge to the Wawona Road intersection was expanded to four lanes. This site is also visible from Discovery View and the area available for development is constrained by Southside Drive and the south wall of the valley.

Yellow Pine. This location was recommended as a valley staging area for day use parking in the *El Portal/Yosemite Valley Comprehensive Design Plan*. The plan also included a valley checkpoint at El Capitan crossover where visitors would confirm overnight and day use reservations before proceeding into the valley. Yellow Pine is reached via Southside Drive and is located on low-lying, level ground between the road and the Merced River about 1.5 miles east of the El Capitan crossover.

Traffic exiting this site would have to continue east to Sentinel Bridge and double back westbound past the lodge and Yosemite Falls. The resulting traffic pattern brings all valley traffic through one of the more congested intersections along Northside Drive at Yosemite Falls. An alternative would be to construct a new bridge across the Merced River near Yellow Pine to provide exiting traffic more direct and efficient access to Northside Drive. As an additional alternative, the Southside Drive could be improved to accommodate two-way traffic between Yellow Pine and El Capitan crossover. Due to the high traffic volumes, it is likely that a four-lane section would be required. This concept was further complicated by the need for a second valley checkpoint to direct day users into the Yellow Pine facility and overnight visitors into the east end of the valley.

Camp 6 (Sentinel Bridge). This site was identified as formal day use parking during the 1992 summer season. Conveniently located near the village and accessible via the Sentinel Bridge, this site offers significant advantages over the current day use parking area near Curry Village. As a stand-alone staging area, Camp 6 offers only marginal benefits in vehicle travel reduction and removal of the influence of cars on the valley's character. In combination with another site, Camp 6 may be used as a tour bus dropoff and parking area, an area for disabled visitor parking and a shuttle transfer point. It also could be used to accommodate winter day use staging, depending on the level of day use demand. Many of the village visitor facilities are within walking distance of Camp 6. Camp 6 has two major drawbacks as a staging area site from a resource protection standpoint; it is visible from Glacier Point, and it is located close to and within the floodplain of the Merced River.

Curry Orchard (Current Primary Day Use Parking). The current day use parking area provided a baseline for comparing other day use staging area options. The existing site has many problems. Located near the far eastern end of the valley, it results in more travel on park roads than other sites. Visitors using the current site travel through every existing congestion point on their trip in and out of the park. The lot is inconvenient to use, located away from the primary activity areas and viewing opportunities. Visitors would rather park in the lots within the village or at informal spaces along the loop road system if they are available. As a result, the Curry Orchard lot is used as a last resort. The remote location of the lot also results in increased trip demand on the valley shuttle, since virtually none of the day use parkers using the lot are within walking distance of their destinations. Finally, the haphazard parking conditions in the former orchard make using the facility difficult. Major development on this site would be visible from Glacier Point.

Curry Dump Site. This site is located east of the Curry Village tent cabins and offers previously disturbed ground and the possibility of limiting the resource impact of developing a parking facility. However, the site suffers from the same drawbacks as the existing Curry Orchard parking area and would result in a net increase in vehicle travel in the valley if developed as the day use parking facility.

Taft Toe (El Capitan Crossover). This alternative has been studied before, but never recommended for use as a day use staging area. The site is located at the base or toe of the cliff below Taft Point. It has the following advantages:

- Views. The site is not visible from the key observation points of Discovery View and Glacier Point. The Taft Toe area is between Cathedral Spires and Sentinel Rock, in an area where the south valley wall draws away from the Merced River. A broad forested area is located between the valley wall and Southside Drive, affording an opportunity to screen the area from travelers along the road.

- Floodplain. A staging facility in the Taft Toe area could be developed well away from the Merced River floodplain. Compared to the other west valley options, this site has minimal potential water quality or scenic river corridor impacts.

- Size. The Taft Toe area offers by far the largest potential staging area site in the west end of the valley. The large site offers opportunities to consolidate visitor services, such as a visitor center, gas station, lodging information, reservations and check-in, camping and backcountry registration and information, fast food service, and a small store with the staging area. Bicycle rentals could be offered as a means to reduce demand on the shuttle system. Ample room is available to channel overnight and day use traffic into separate areas, and to provide reservation confirmation for overnight guests driving into the valley.

- Traffic Access and Egress. The Taft Toe area is immediately adjacent to the El Capitan crossover. The location is strategic because it would allow direct access from the valley approach roads without backtracking, and it would afford direct egress from the staging area via the El Capitan crossover to Northside Drive. This location would be most convenient because it would eliminate backtracking on both the access and egress trips, and it is only 1.4 miles from the point at which all valley access roads converge. It is nearly six miles west of the current day use parking lot, resulting in a substantial reduction in day use vehicle travel in the valley.

- Traffic and Visitor Management. The Taft Toe site would allow all traffic management and visitor check-in functions to be accomplished in one location. Overnight visitors with reservations could be directed to a check-in area, where reservations could be confirmed and a vehicle pass provided to allow passage through a simple checkpoint. Adequate area is available to provide short-term parking for visitors seeking standby access to overnight accommodations and a return roadway to the valley exit route for those unable to secure an overnight unit. Day use visitors can be directed into a special parking area, sized to accommodate GMP visitation levels. Convenient access to a valley connector shuttle route would be provided. Visitation could be allowed on a first-come-first served basis using the parking lot to limit access, or on a reservation basis, with visitors confirming day use reservations at the staging area. In either case, traffic management would be facilitated by the direct access to the valley exit route via the El Capitan crossover. All traffic movements for the staging area can be accommodated without changes in roadway use or new bridges over the Merced River.

- Opportunity to Close Roads. By intercepting over 75% of vehicular traffic entering the valley, creating a staging area at Taft Toe would allow Southside Drive to be converted to a two-way road from the staging area to the east. This would allow all visitor traffic to be accommodated on Southside Drive, facilitating closure of Northside Drive between Sunnyside Campground and the El Capitan crossover. The Northside Drive

Roadway could be maintained as an administrative road and emergency route and could be used by bicyclists. This road closure would open wildlife access from the north to about three miles of the Merced River, and would discourage damaging visitor use of the north bank. As described in the next section, additional opportunities exist to remove roadways and visitor facilities from the north side of the river, further restoring the area to natural conditions and freeing the river from the influence of development which now encroaches on the waterway on both sides.

Private vehicle travel, bus vehicle travel (assuming that a shuttle connection between the staging area and Yosemite Village and Yosemite lodge would be provided by buses) and VTS capital and operating costs for the Taft Toe site were compared to those for the Yellow Pine and Pohono Quarry sites. Table 9 shows the key findings of this comparison.

The Pohono Quarry site would minimize private vehicle travel, since it would intercept all day use valley visitors entering from the north and west at the far western end of the valley. The Yellow Pine site would generate the highest volume of private vehicle travel, since all visitor trips would traverse the valley loop as far east as Sentinel Bridge. The Taft Toe site would generate substantially lower private vehicle travel volumes than those for Yellow Pine, although higher than those for Pohono Quarry.

The private vehicle travel reductions possible with the Pohono Quarry site are achievable only with an expanded VTS fleet and higher VTS operating costs. A bus-based VTS connection from the staging area at Pohono Quarry would require over 5,200 daily bus miles, compared to 3,200 for Taft Toe and 2,000 for Yellow Pine. Higher particulate and NOx emission rates of diesel buses would offset emission reductions from private vehicles, potentially resulting in poorer air quality if diesel buses were used to connect the staging area with the east end of the valley. Future alternative fuels advances for buses could reduce the undesirable emissions associated with a bus shuttle system for any of the staging area sites and could reduce the emissions disadvantage of the Pohono Quarry site.

Table 9: Comparison of Valley Staging Areas

Comparative Measure	Pohono Quarry	Yellow Pine	Taft Toe
Private Vehicle Vehicle Miles Travelled Per Year in Valley	905,538	7,582,854	3,325,560
Bus Vehicle Miles Travelled Per Year in Valley	1,408,900	531,800	877,100
Total Vehicle Miles Per Year	2,329,800	8,113,300	4,202,000
Bus Fleet Capital Cost	$6,525,000	$3,480,000	$4,567,500
Bus Fleet Operating Cost Per Year	$5,072,100	$1,914,400	$3,157,700

Source: BRW, Inc.

Note: Assumes shuttle connection between staging area and Yosemite Lodge via Camp 6 using bus technology. Accommodates day use visitors only. Bus fleet costs represents total costs (contingency percentage applied).

A guideway technology, employing electrically powered vehicles, would eliminate the noise and emissions impacts of a Pohono Quarry staging area. Such a system would be 2.5 miles longer for the Pohono Quarry site than for Taft Toe. The capital cost increase for a guideway connector from the quarry, compared to Taft Toe would be $78.2 million. Annual operating costs would also be substantially higher for the service to the quarry.

Although the Pohono Quarry offers the potential for significant reductions in private vehicular travel, the air quality benefits and VMT reduction of this site would be balanced by negative impacts to the valley vista from Discovery View and higher development costs for parking due to the need for a parking structure. Increased management staff and facilities would be required to confirm overnight reservations and limit day use vehicle access at El Capitan crossover. There would be greater impacts to the Merced scenic river corridor and higher capital and operating costs for the transportation system.

For the purposes of assessing the feasibility of VTS options in Yosemite Valley, the Taft Toe site was selected as the best staging area, based on its advantages and the problems identified for the other potential sites.

VTS Route Options. The patterns of development and road systems in the valley combine to complicate shuttle route options. The current shuttle system is composed of several loops which cross each other and result in a great deal of out-of-direction travel for many trips. Shuttle drivers encourage passengers to transfer between buses along the route to save time, but the transfers are inconvenient. Expanding service to the west to serve the Taft Toe staging area would further complicate the route, which is already difficult for first-time visitors to comprehend.

The Taft Toe staging area would not be visible from Discovery View.

Intercepting day use visitors would increase VTS demand by at least two boardings (one inbound and one outbound) for each valley day use visitor. VTS ridership in the valley would double. The existing shuttle bus system is becoming overcrowded, despite offering service at six-minute intervals. Mixing valley access trips with the circulation trips now served by the shuttle would create a need for service twice as frequent, or vehicles twice as large as operated on the current system. Service could become unreliable, and passengers would be crowded into large groups, compromising the intent to provide a pleasant experience free from conditions similar to an urban setting.

Splitting the VTS system into two separate routes, one for valley access and the other for circulation, would reduce the crowding and improve the operating characteristics of the service. With the implementation of two-way roadways or the provision of fixed guideway service along a bidirectional route, two simple shuttle routes could be provided, serving all major activity centers in the valley. Alternatively, a pair of one-way loop routes could be used to serve the same basic functions.

The following maps show schematic concepts for a pair of one-way loop shuttle routes and an alternative pair of bidirectional shuttle routes serving the valley. Each concept provides a major transfer point at Camp 6, near the village. A combination of loop service on one line and bidirectional service on the other could also be considered.

The loop option has the advantage of covering a broader area with the same amount of service.

Loops are confusing to passengers, since return trips are not made along the same path as the original trip. Loops also cause out-of-direction travel for many trips. For example, with a west valley loop, trips from the lodge to the village would require a 6-mile round trip to the El Capitan crossover and the staging area for a trip of less than 1 mile if made directly.

The loop concept is more applicable to the east end of the valley shuttle service. Out of direction travel can still occur, but the length of the diversion is not as great as in the west end of the valley. The east end route could be simplified by extending the loop from its current turnback at the Mirror Lake trailhead north to a walking trail which connects to the Ahwahnee Hotel area along a route adjacent to the north valley wall. This loop would involve the construction of 1.5 to 2 miles of new shuttle roadway or guideway.

The bidirectional shuttle option focusses service on a single corridor. If not relocated as discussed in the Implementation Chapter of this report, some activities would not be well served with an east valley bidirectional shuttle. With this shuttle option, vehicular travel on the north side of the Merced River is limited to the short stretch of Northside Drive between the village and Yosemite Lodge, further freeing the river corridor from noise and visual disruptions. The shuttle routes would be simple and easy to understand for first time visitors and would not cause out-of-direction travel to any destination.

The bidirectional route concept would eliminate out-of-direction travel, offer simple routes, be easy for visitors to understand and would remove VTS traffic from sensitive areas. These key factors suggest that bi-directional routes are preferable to loops in the valley. As a result, the detailed evaluation of alternatives assumed that VTS service would be provide along two bi-directional routes in the valley.

Future detailed planning efforts could reconsider the loop options, based on more complete travel pattern data for valley trips and decisions on the locations of visitor facilities. Variations on bidirectional shuttle options could be considered in the east valley, including providing a one-way loop at the east end of the route.

FINAL ALTERNATIVES DEFINITION

Final alternatives were developed for more detailed analysis and evaluation for the three major activity areas in the park. The alternatives are described below and illustrated on the maps at the end of this chapter. Each map includes an overview of the service provided and the equipment required for each alternative. Additional details describing the key aspects of each alternative are presented in charts included in appendix 8.

Mariposa Grove Access

Three alternatives for accessing the grove were identified for initial screening. Each of the Mariposa Grove access alternatives includes courtesy transit service for overnight visitors at the Wawona Hotel and campground. The actual number of overnight visitors carried to the grove by the transit service would represent a portion of the established GMP visitor level and would affect the parking and/or shuttle passenger carrying requirements of each alternative. For the purposes of this study, the parking and operational requirements for each alternative were developed using the total GMP visitation levels without estimating a reduction for Wawona overnight visitors using the courtesy service.

Grizzly Giant Staging Area. This alternative would remove the existing parking from the lower grove and develop a new parking lot and staging area east of the existing lot and south of the grove in the general vicinity of the Grizzly Giant.

The new parking lot would provide 200 automobile and recreational vehicle spaces and 10 tour bus spaces. The grove tram and its related facilities and the drop-off/pickup for a courtesy shuttle to the Wawona Hotel and campground would also be relocated here. Other facilities not required for resource management would also be relocated away from the grove. Links to existing trails in and near the grove would be made. Visitors would access the upper grove either by the tram or on foot. The lower grove would be reached from the Grizzly Giant on foot, following the existing paved pathways.

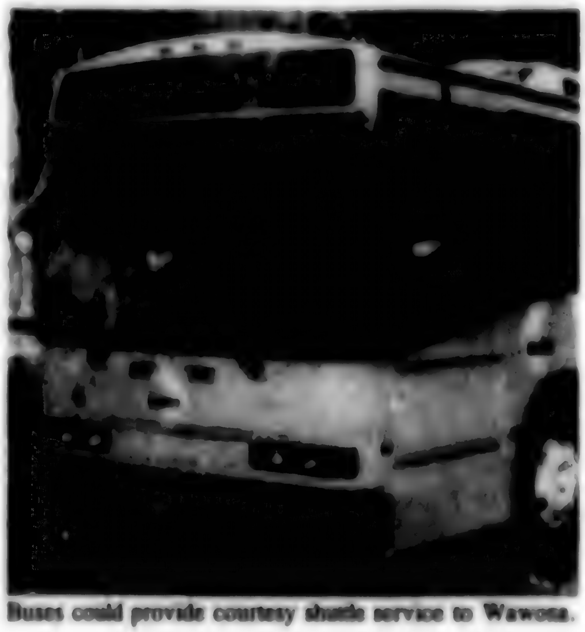
Vehicular access to the staging area would be via the existing Mariposa Grove access road; however, just prior to entering the lower grove, a new two-way grove bypass road would be constructed. This bypass would be located south of the lower grove and would be approximately .75 mile long to reach the new staging area.

Alternative access to the new staging area could be provided by upgrading a USFS road east and north of Goat Meadow. This two-way road would be approximately three miles long. The road, which was considered as an alternative access route in the draft development concept plan for the grove, follows steep terrain. It is not explored in detail here, but could be evaluated as part of a new plan for the area. If used, the Goat Meadow access route would require the relocation of the south entrance station to the south of the Goat Meadow access road intersection with California Highway 41, near the park boundary.

Goat Meadow Staging Area. This alternative would include removing of the existing vehicle parking lot from the lower grove and developing a new parking lot and staging area southwest of the grove in Goat Meadow on USFS land. Visitors would be shuttled to the grove from the new parking lot via California Highway 41 and the existing Mariposa Grove access road.

The new parking lot would provide 290 automobile and recreational vehicle spaces. A courtesy shuttle serving the Wawona Hotel and campground, regional tour buses, and the Goat Meadow shuttle would use the existing staging area on the edge of the lower grove to board and drop-off passengers. Future tour bus parking demand may require the bus parking area to be expanded by 3-4 stalls. Connections with the grove tram would occur as they do today. With the Goat Meadow alternative, it would be necessary to relocate the south entrance station approximately .75 mile to a location south of the Goat Meadow access road. The existing grove access road would be closed to private vehicular traffic year-round.

Wawona Staging Area. This alternative includes removal of the existing vehicle parking lot from the lower grove and development of a parking and grove shuttle bus staging area within the Wawona district. Several alternative staging area sites in the Wawona district were examined and are illustrated on the Mariposa Grove Access Alternatives map. Access to Mariposa Grove would only be via a shuttle bus serving the staging area and the Wawona Hotel and campground, or by tour bus. All buses would pick up and drop off passengers at the existing staging area in the lower grove, where connections to the grove tram would be made. An additional 3-4 bus stalls may be required to meet the future demand for tour bus parking. Within the Wawona district, parking would be provided for 350 vehicles. Although not essential to this alternative, the south entrance station could be relocated to the south to reduce traffic conflicts at the grove access road intersection with California Highway 41, and to accommodate expanded visitor information, orientation, and reservation services. Information and orientation would also be required at the Wawona staging area.



Buses could provide courtesy shuttle service to Wawona.

Tuolumne Meadows/Tioga Road Circulation

Two alternatives to improve Tuolumne Meadows and Tioga Road circulation were developed for detailed analysis. Each included the development of a new staging area east of the meadows at a gravel pit located north of Tioga Road. The staging area would act as the primary access point for two shuttle services. One shuttle would serve circulation within the Tuolumne Meadows area, with a route similar to the current shuttle. The second shuttle would provide access to the trailheads located along the Tioga Road west of the meadows to Olmstead Point. Low floor buses would be used along both routes, with modifications to accommodate backpacking gear, climbing equipment, and other recreational items.

The parking and operational requirements for these alternatives were developed using the GMP visitor levels for Tuolumne Meadows, Tioga Pass, and the Tenaya Lake area. The general management plan does not state whether any of the visitor trips to these independent areas would be combined. For the purposes of this study, parking and operational requirements for each alterative were developed using the sum of GMP visitor levels to these areas without estimating a reduction due to visits to multiple areas in a single day.

The alternatives differed in the treatment of visitor parking along the route. The first alternative is a mandatory shuttle system, which assumes the removal of existing parking areas in the meadows and along Tioga Road. Strict enforcement would be required to curtail parking along the roadside at activity areas. Parking would remain in the campground, lodge, wilderness permit lot, and Dog Lake trailhead lot for overnight visitors. All other day use visitors, including those arriving by tour bus, would be required to park in the staging area.

The second alternative consists of a voluntary shuttle system, which assumes that the existing formal parking areas along the road would remain. Prohibition of roadside parking and parking in unmarked informal areas was assumed as part of the voluntary shuttle option, with the staging area and shuttle service taking the place of overflow parking. Careful delineation of the parking areas and active enforcement would be required to make the voluntary alternative successful in eliminating resource damage due to roadside and spillover parking. Tour bus parking would be located in the new staging area.

Buses would serve Tuolumne Meadows and Tioga Road shuttle passengers most effectively.

Yosemite Valley Access and Circulation

In Yosemite Valley, the final alternatives consisted of a staging area and a transit system comprised of two shuttle routes. Day use visitors arriving by private vehicle would be intercepted at a staging area located at the El Capitan crossover in the Taft Toe area. Tour buses bringing day use visitors into the valley would proceed to Camp 6, where a bus parking area would be provided. As an option, day use tour bus passengers could be dropped off and their buses parked at the Taft Toe staging area. Overnight lodging guests and campers would drive their vehicles to their accommodations, where they would remain parked for the duration of the visitors' stay in the valley. Tour buses with overnight guests would drop passengers off and pick them up at the lodging facilities and then park, either close to the lodging area, at Camp 6, or at the staging area. The staging area could include an overnight visitor check-in facility, where reservations could be confirmed. Visitors awaiting accommodations on a stand-by basis could be accommodated and the system of valley VTS services could be clearly described to all visitors.

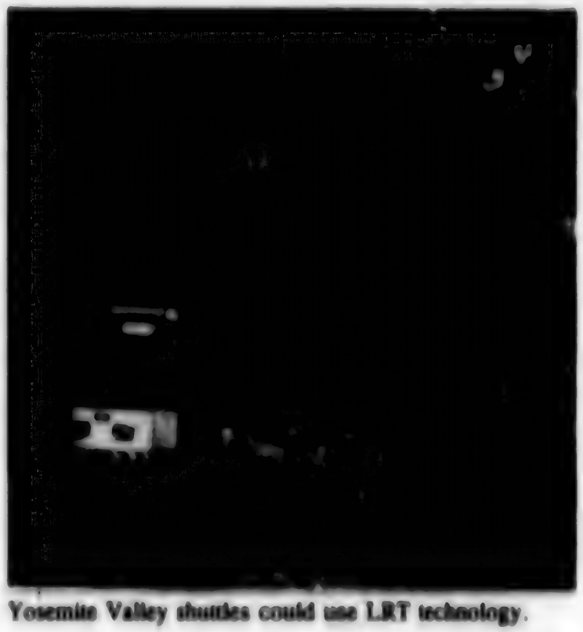
The first shuttle route (valley connector) would provide service between the staging area and the Yosemite Lodge/Yosemite Falls area via

Southside Drive, Sentinel Bridge and Northside Drive. Stops would be made at the major activity points along the way in each direction. The second shuttle (valley circulator) would serve the east end of the valley, traveling between the Ahwahnee Hotel and Happy Isles Nature Center, using the Sentinel Bridge crossover and Southside Drive. A transfer point between the two routes would be provided in the vicinity of Camp 6 or Yosemite Village. Day use tour bus passengers would have access to both routes at the Central transfer station.

Four technology options were developed for each shuttle route: standard bus, articulated bus (passenger trams could also be considered), light rail transit (LRT), and an elevated people mover using group rapid transit (GRT) technology. Light rail transit would be constructed at-grade, most probably adjacent to the existing roadway, although it would be possible to construct the system in the roadway, where it would share the lanes with private vehicular traffic. LRT vehicles are powered by electricity that is delivered to the vehicle by an overhead wire. GRT options would involve the construction of an elevated guideway, 16 to 17 feet above the valley floor. GRT vehicles are electrically powered by a special contact rail located in the guideway, or by linear induction motors that operate with electrical current within the guideway. The GRT system would require elevated stations with elevators for disabled access and stairs or escalators for general visitor access.

The system of day use visitor access and circulator service for all visitors would require supporting actions to be most successful. Along with the new staging areas and the VTS routes, the following improvements and modifications to current operations would be required:

- Remove visitor parking from all activity areas except for reserved parking spaces at lodging sites and campgrounds. Limited parking would be provided for disabled access. Short-term parking for campers shopping at the Curry Village Store could be considered in the Curry Orchard. Overnight visitors would be informed of parking limitations and the use of the valley shuttle system at the staging area or after they had reached their overnight destination.

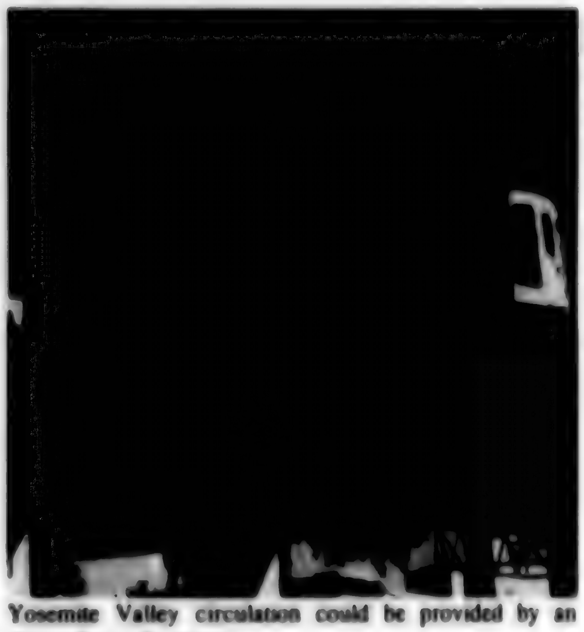


Yosemite Valley shuttles could use LRT technology.

- Consolidate camper services, especially shopping for provisions, in Curry Village to divert demand away from the village.

- Relocate some or all visitor center functions to the Taft Toe staging area. At a minimum, provide visitor information, orientation, and interpretation, and restroom facilities at the staging area. Confirmation of overnight reservations would be required for lodging, camping, and backcountry users. Day users would also need to check in if reservations are implemented for valley day use. Fast-food services and concession-operated gift sales and service station functions could be located at the staging area. Bike rentals for day users could be provided to reduce shuttle demand. For the LRT and GRT options, vehicle storage and maintenance would be located at Taft Toe. The bus alternatives could use Taft Toe or another location for vehicle storage and maintenance.

- The east end of the valley shuttle route, shown on the Yosemite Valley VTS Alternative map, assumes the relocation of camping and the stables from the north side of the Merced River. This would reduce habitat fragmentation and stream bank damage caused by visitors and provide wildlife access to the stream from the north. The Upper River and Lower River campgrounds, and the group camp would be affected by the relocation, which would allow closure and removal of Stoneman Bridge. Shuttle alternatives that would allow the existing facilities to remain are shown as staging options in the Implementation Chapter.



Yosemite Valley circulation could be provided by an elevated people-mover.

- Close Northside Drive between Sunnyside Campground and El Capitan crossover to visitor traffic. Closure of Northside Drive would also be possible from El Capitan crossover to Pohono Bridge, if Southside Drive was upgraded to four lanes. This would remove visitor traffic from all of the north side of the valley except for the short stretch between Yosemite Lodge and the Ahwahnee Hotel. The roads on the north side of the Merced River could be retained for NPS needs and bicycle traffic only.

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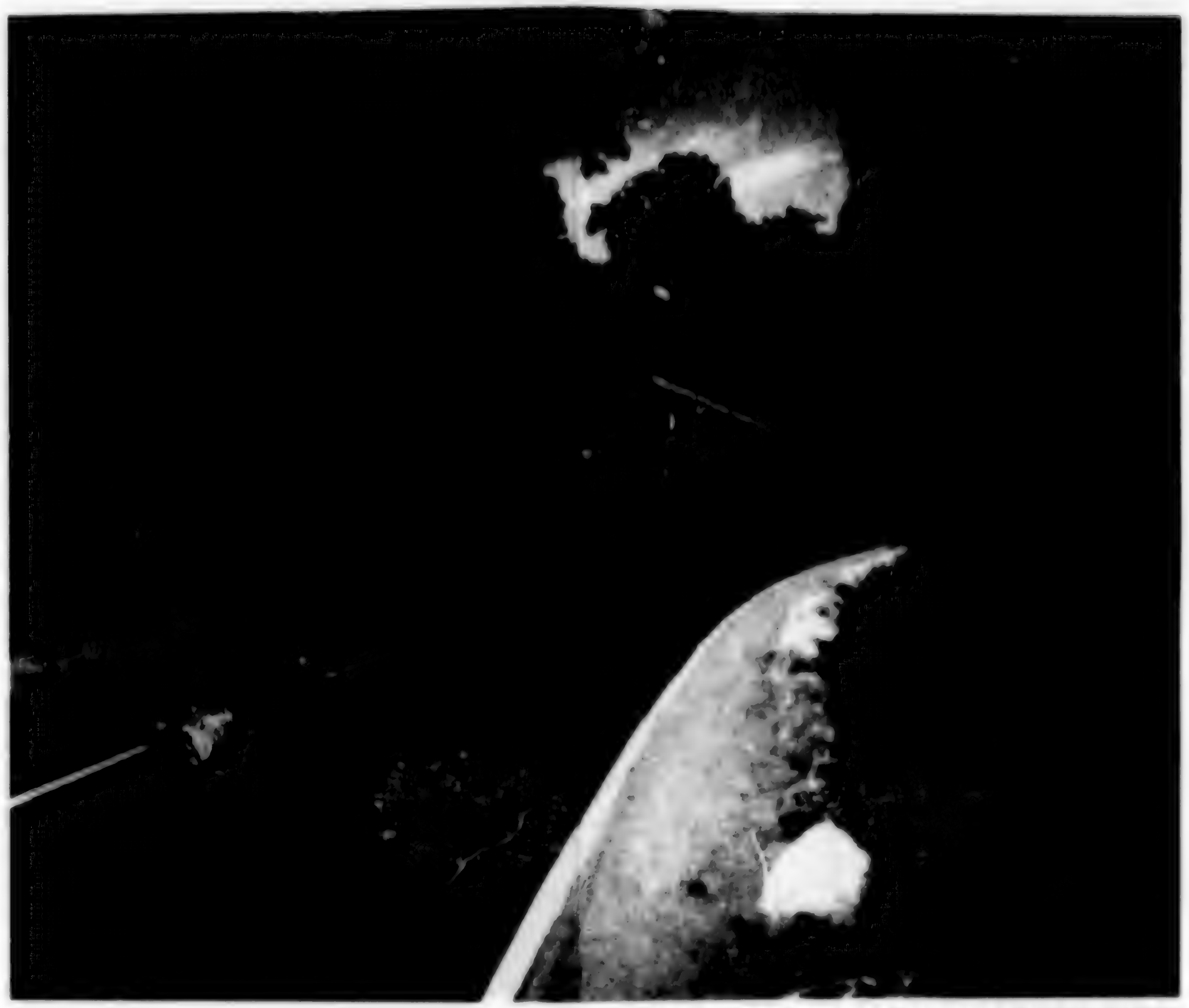
VALLEY EXISTING CONDITIONS
VIEW LOOKING EAST



VALLEY VIEW WITH AT-GRADE
LIGHT RAIL TRANSIT SYSTEM

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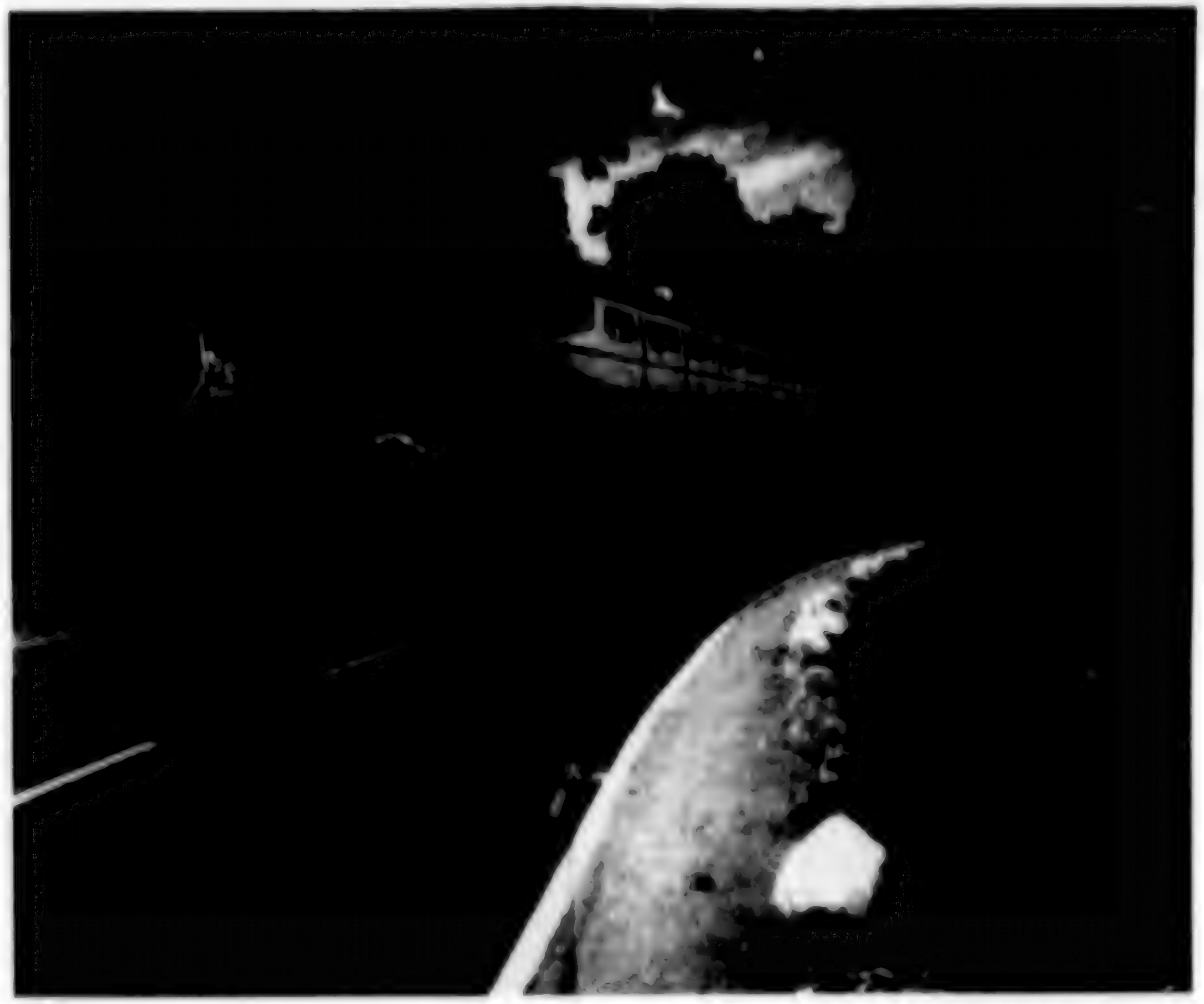
VALLEY EXISTING CONDITIONS
VIEW LOOKING EAST



VALLEY VIEW WITH ELEVATED
RAIL TRANSIT SYSTEM

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ALTERNATIVES EVALUATION

The final alternatives for Mariposa Grove access, Tuolumne Meadows circulation, and Yosemite Valley access and circulation were evaluated against criteria in each of the key evaluation topics described in the previous chapter: visitor transportation and management, visitor experience, resource impacts, consistency with park goals, cost and cost-effectiveness, and implementation constraints or requirements. No recommendations to pursue specific alternatives were made. The intent of this report was to establish the feasibility of enhanced visitor transportation systems, and to identify the major benefits and impacts of VTS implementation in Yosemite National Park. More detailed analysis will be required to select preferred alternatives in each activity area and to identify all of the implications of their implementation.

The alternatives were developed with the goal of substantially reducing the impact of private vehicular traffic and parking in the most congested areas of the park, and in doing so, not create new and equally undesirable impacts from VTS operations. Each of the options provides a major contribution to reducing the influence of vehicles in the park's most significant areas.

The alternatives reflect a philosophy of maintaining the personal freedom of park users to view and experience most of Yosemite on their own schedule and on their own terms. Active measures to manage visitor use and restrict access by private vehicles were only considered where the volume of visitation and the potential for crowding threaten resource damage and create a diminished quality of visitor experience. Alternatives were developed to reduce vehicular presence in the most sensitive areas of the park while maintaining the ability of visitors to conveniently see more than one area of the park in a single day, and to make through trips beginning at one entrance station and ending at another.

A balance between visitor access and resource protection was achieved by providing adequate facilities for private vehicles in areas that would minimize resource impacts. Visual and spatial separation from significant visual and natural resources was considered in developing the alternatives. The final alternatives combine staging area functions with visitor orientation, reservation services, and interpretation to encourage resource protection.

The following sections provide a brief overview of the most significant aspects of each alternative organized by activity area. Comparisons to existing conditions and among the alternatives are presented. The maps provided at the end of the previous chapter illustrate the key physical aspects of each alternative. Charts at the end of each section in this chapter compare the alternatives.

MARIPOSA GROVE ACCESS

Impacts Common to All Alternatives

Many aspects of the grove alternatives are similar, especially with respect to eliminating vehicular impacts from the lower grove area, and providing an ability to effectively manage visitation at the levels prescribed in the general management plan. The most significant common aspects of each alternative are listed below.

Visitor Transportation and Management. Each of the alternatives would facilitate the management of daily visitation levels because parking and access facilities would be consolidated at distinct, identifiable locations that would accommodate the GMP visitor use limit of 3,850 visitors per day. Length of stay, mode of travel, and arrival time would be considered. In each alternative, a day use reservation system is recommended to assist in managing the daily use levels indicated in the general management plan. A reservation system would help to avoid visitor frustration, confusion, and unnecessary travel. Flexibility to address no shows would need to be provided.

By controlling access to the staging areas, visitors could be redirected to alternative park attractions when the grove is at capacity. It would also distribute visitation more equally over time. This would minimize the visitor management problems associated with major peak arrivals and visitor circulation between dispersed, poorly controlled parking areas.

Visitor Experience. The visitor experience at Mariposa Grove would be substantially improved if educational and interpretive programs were provided as part of the grove experience. The removal of nonessential facilities, reclamation of vegetation and soil systems, and control of surface erosion would provide an environment in which existing trees would flourish and seedlings could develop. This would help visitors to better understand the processes and events that have shaped Yosemite's natural features and the relationship of cultural values to the preservation of the park.

The removal of parking from Mariposa Grove would alleviate the perception of clutter and crowding in the area. The use limits in the general management plan would further ensure that overcrowding does not distract the visitor from enjoying the resources.

Improvements to the intersection of the Wawona Road and the Mariposa Grove access road would substantially reduce the confusion at the entrance station. Information could be provided to visitors about conditions in the grove and the rest of the park and suggested itineraries could be provided.

A significant visitor benefit of all of the alternatives would be reduction in visitor confusion by providing clearly defined parking areas and shuttle boarding points. These benefits would be enhanced by the provision of easily accessible information at facilities located at the park entrances and by a well-developed reservation system. During peak visitation periods, visitors could be advised to go to other park attractions before visiting the grove.

Resource Impacts. Perhaps the greatest benefit of all of the alternatives is the removal of existing private vehicle parking from the lower grove. This opportunity is greatest with the Grizzly Giant alternative because the grove tram and related facilities would be relocated out of the grove as well, whereas the other alternatives retain tour bus, Wawona courtesy bus and grove tram activities at their present location on the edge of the lower grove. The relocation of visitor parking would allow restoration of natural ecosystems, improve the soil conditions, and enhance regeneration of the giant sequoia species.

Implementation. For any of the alternatives to optimally improve visitor transportation management and visitor experience, the existing south entrance station should be relocated to the south along California Highway 41. The Wawona alternative could function with the entrance in its present location; however, there is insufficient area for the safe and effective provision of an information center, and traffic conflicts would still occur at the tee intersection.

Each of the alternatives could be operated and managed by the existing concessioner. Each would also require complete environmental documentation to support decisions. The Grizzly Giant option has been analyzed in previously prepared draft studies.

Evaluation of Alternatives

The major features of each alternative are illustrated on a map appearing at the end of the previous chapter. The existing conditions are used as a basis for comparing each alternative. Additionally, a summary evaluation chart at the end of this chapter indicates the major differences among the alternatives, including both adverse impacts and unique opportunities associated with each. The following text further describes these major differences.

Visitor Transportation and Management. The most significant difference between the alternatives is the convenience of visitor access to the grove. Because a Grizzly Giant staging area would provide the most direct access to the grove, there would be no delay in accessing or leaving the area. Visitors would drive their own vehicles to a parking lot containing 200 spaces. The need to transfer to the grove shuttle at outlying staging areas would cause visitor delays of between 24 minutes and 36 minutes, including shuttle travel time and waiting time. These delays would require additional parking spaces at the staging areas (80 at Goat Meadow, 140 at Wawona) to account for the lengthened stays of visitors. The alternatives with remote staging areas cause out-of-direction travel for visitors making trips to the grove as part of a through trip and for those visitors approaching the grove from the direction opposite the staging area.

The alternatives that emphasize bus and shuttle access would provide somewhat greater control over the arrival times of visitors at the grove. Visitors would arrive in larger groups with these alternatives, whereas with the Grizzly Giant alternative, arrivals by car would result in smaller visitor groups. By controlling the scheduled arrival of the buses and shuttles, closer management of the distribution of visitation over time is possible with the Goat Meadow and Wawona alternatives.

Providing adequate parking at the Mariposa Grove would reduce congestion and improve visitor experiences.

Visitor Experience. Because of the increased utilization of shuttles and buses, and continued use of the existing staging area on the edge of the lower grove, there may be some degradation of the visitor experience, particularly from increased engine noise for the Goat Meadow and Wawona alternatives. In addition, visitors could perceive an increase in crowding, since bus and shuttle access would concentrate visitors into larger groups. This would be particularly noticeable when a number of buses and shuttles arrived simultaneously at the grove. The Goat Meadow and Wawona option would be perceived as less convenient for most visitors.

Resource Impacts. The most significant difference among the alternatives is the change in daily vehicle miles travelled (VMT) by cars, buses, and shuttles traveling to and from the grove. The Goat Meadow alternative would increase automobile miles traveled by approximately 620 miles per day, primarily because of the extra mileage required for southbound visitors returning (northbound) to the park after their visit to the grove. At present, approximately 30% of visitors to the grove have this travel pattern. The Wawona alternative would, however, reduce automobile miles traveled by approximately 3,498 miles per day, because trips by visitors from the north would be interrupted at Wawona, seven miles from the grove. With the Grizzly Giant alternative, there would be minimal change to existing automobile miles traveled because the trip to the grove would be largely unchanged.

Concurrently, daily bus miles traveled would be highest with the Wawona alternative at 1,805 miles per day. The Grizzly Giant alternative would result in a reduction in bus miles traveled compared to today's operation. The Goat Meadow alternative would result in approximately 1,133 daily bus miles traveled. The greatest impacts of bus miles traveled associated with the Goat Meadow and Wawona alternatives would be increased emission of nitrous oxides and particulates compared to the Grizzly Giant option.

The sizes of the parking lots at the staging areas and their related impacts on critical environments would vary between the alternatives. At Grizzly Giant, the 200 private vehicle spaces and 10 bus spaces would be on previously undisturbed land and would increase the potential for run-off, soil erosion, and disturbance to native habitat. The site is located mostly outside of the designated wilderness area, but within a designated archaeological district. It also includes approximately .75 mile of new road with similar resource impact concerns.

At Wawona, the 350 auto spaces and 10 bus spaces could have meadow or meadow edge impacts with accompanying loss of wildlife habitat. There also could be impacts to the south fork of the Merced River, a designated wild and scenic river. At Goat Meadow, the 290 auto spaces would be on USFS land that already has been cleared. The Goat Meadow option would require approximately 1 mile of road to be widened and improved, with potential run-off and habitat loss impacts. These impacts would occur largely on USFS land.

Consistency with Existing Plans. The Wawona alternative may result in impacts to private inholdings, including noise, traffic, and disruption due to increased visitor activity. The Goat Meadow option would support the philosophy, stated in the 1992 National Park Service Vail Agenda report, of providing visitor services outside the park boundaries.

Cost and Cost Effectiveness. The Goat Meadow and Wawona options would be the most costly, involving the construction of larger parking areas and the provision of shuttle bus service not required with parking at Grizzly Giant. The costs for each alternative are presented in table 10. A more detailed summary of the cost estimates is included in appendix 6.

Implementation. The Goat Meadow alternative will require some additional staff for law enforcement and resource protection in a new area of visitor activity. Coordination with the Forest Service regarding implementation and management of the road improvements and staging area would be required.

TUOLUMNE MEADOWS/TIOGA ROAD CIRCULATION

Impacts Common to all Alternatives

The provision of a consolidated parking facility in a previously disturbed area and access to the key activity areas via shuttle service would produce many benefits in the Tuolumne Meadows area. The impacts common to mandatory and voluntary shuttle systems in the area are discussed below.

Visitor Transportation and Management. Both of the alternatives would consolidate and simplify the operation and management of parking and shuttle operations in the area, consistent with the visitation limits in the 1980 general management plan. At present there is dispersed parking and random edge of road pulloff parking interspersed with shuttle stops. Both alternatives would provide transfers between modes at a designated and appropriately sized staging area. Parking would be clearly defined for day users and tour buses.

Table 10: Cost Summary for Mariposa Grove Access Alternatives

Cost Element	Goat Meadow Staging Area	Wawona Staging Area	Grizzly Giant Staging Area
Construction and Equipment (millions)	$8.8	$8.7	$5.3
Annual Operating and Maintenance (millions)	$1.1	$1.7	$0.4
Annual GMP Visitors	854,700	854,700	854,700
Annualized Cost per Visitor	$2.15	$2.89	$0.94

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision of planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Modifying visitor access to the area would require increased visitor awareness. Information directing visitors to and from the staging area would need to be provided at park entrances and along Tioga Road. Providing shuttle access only could help to control visitor access to sensitive resource areas.

Visitor Experience. Visitor experience would be enhanced through clarification and simplification of access and parking in the area. Confusion and uncertainty would be reduced for the visitors, and, for many, convenience would be greatly improved.

For some specific users, particularly hikers and climbers, access time and walking distances to activities would increase. Although the shuttles would run on a regular schedule with headways timed to visitor demand, there would be some queuing and waiting in the staging area or at shuttle stops that would affect the length of stay in the area. Shuttles would not stop at every visitor preferred destination, which would increase the walking distance for those who would park on road edges. Otherwise the required transfer of hiking and climbing gear to the shuttle may be viewed as inconvenient.

For most visitors, the overall experience in Tuolumne Meadows would be significantly enhanced by the removal of all or most of the parked cars that presently line the edges of Tioga Road. In addition, the visual disruption in the meadows created by dispersed parking areas would be significantly reduced, allowing the natural features of the area to be experienced.

Resource Impact. With both alternatives, the elimination or reduction of random road pulloff and trailhead parking would significantly reduce habitat disturbance, soil compaction and erosion, and water quality impacts. The prolification of social pedestrian trails across the meadows to the river edge would be discouraged. Removing parking to a remote area would enhance the scenic quality of the Tuolumne River.

The staging area would also offer the opportunity to remove development and visitor services from sensitive natural habitat and an archaeological district.

Consistency with Park Service and Regional Planning Goals. Both alternatives are consistent with the general management plan and the concession services plan objectives for Tuolumne Meadows — restoration of meadows by removal of nonessential roads and trails, relocation of selected visitor services, removal of designated road edge and trailhead parking, and relocation of development away from the river edge.

Cost and Cost Effectiveness. Increased shuttle traffic on Tioga Road might require additional road repairs. The new parking area and shuttle services would be costly and would require new funding sources.

Implementation. Location of the parking lot and staging area outside the meadows would require additional staff for law enforcement and resource protection in a new area. Planning for and implementation of the parking and staging area outside of the meadows would require full environmental documentation. The area proposed for the staging area was heavily disturbed by gravel extraction. Both alternatives could be implemented utilizing turnkey construction and operation by the existing concessioner.

Evaluation of Alternatives

The major features of each alternative are illustrated on maps appearing at the end of the previous chapter. The existing conditions are used as a basis for comparison of each alternative. Additionally, a chart at the end of this chapter indicates the major differences between the alternatives, indicating both adverse impacts and unique opportunities associated with each. The following text describes these major differences.

Visitor Transportation and Management. The staging area with mandatory shuttle use would improve local traffic management significantly, including reduced traffic circulation. It would also reduce pedestrian/vehicle conflicts. This alternative also distributes visitors more efficiently, providing increased control and management of meadow resources. The voluntary shuttle alternative with limited parking would not be as effective in managing overall local traffic and access to sensitive areas or pedestrian/vehicle conflicts, since the use of the shuttle is not required for visitor access to sites.

A centralized parking and shuttle staging facility would reduce vehicular conflicts and limit damage to roadside resources.

Visitor Experience. There would be added enhancement of the visual character of the area with complete removal of all edge of road pulloff and trailhead parking for the mandatory shuttle alternative. This benefit might be offset for hikers and climbers who would have to transfer recreational equipment on and off the mandatory shuttle.

Resource Impacts. Integrating trailheads and key visitor areas with mandatory use of shuttle stops would focus visitor activity into less sensitive areas and allow reclamation of previously damaged areas. Voluntary shuttle use with limited pulloff parking would not be as effective in controlling visitor impacts on sensitive resources in the area.

Cost and Cost Effectiveness. The mandatory shuttle option would have substantially higher costs than the voluntary option. Table 11 provides a summary of the costs of the two Tuolumne Meadow shuttle options. Appendix 6 provides a more detailed summary of the cost estimates.

Implementation. The staging area with mandatory shuttle use would greatly facilitate and simplify parking and traffic enforcement in the area. The voluntary shuttle with some distributed parking would require increased surveillance and enforcement to restrict parking to the formal parking areas distributed along Tioga Road.

Table 11: Cost Summary for Tuolumne Meadows Shuttle Alternatives

Cost Element	Mandatory Shuttle System	Voluntary Shuttle System
Construction and Equipment (millions)	$16.7	$13.4
Annual Operating and Maintenance (millions)	$1.4	$1.0
Annual GMP Visitors	517,644	517,644
Annualized Cost per Visitor	$5.75	$4.46

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision of planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

YOSEMITE VALLEY ACCESS AND CIRCULATION

Impacts Common to All Alternatives

The following impacts of the potential day use visitor staging area at Taft Toe and the VTS alternatives providing valley access and circulation are common to all alternatives:

Visitor Transportation and Management. All alternatives would remove the demand for at least 1,750 parking spaces now used by day use visitors to the valley and reduce the volume of private vehicular travel in and out of the east part of the valley by 77%, or 6,172 daily vehicle trips. Further reductions in vehicular travel would be achieved by eliminating all but a few in-valley circulation trips by private vehicles, including trips now made by visitors circulating in the valley in search of a parking space. Traffic congestion now occurring at the village and at the Yosemite Falls parking area would be eliminated. Total parking demand in the east portion of the valley would be reduced by 41%.

The proposed alternatives provide an efficient means of managing prescribed visitation levels by consolidating day use parking into a single area. It would be sized to accommodate GMP visitation levels and observed visitor arrival patterns and lengths of stay. Traffic management, including confirmation of day use and overnight reservations, turn-back of unauthorized vehicles, access to staging area parking, and egress from the valley would be facilitated by the proposed location of the staging area and a companion vehicle checkpoint. The alternatives afford opportunities to provide visitor orientation and interpretation in advance of visitor contact with significant resources. Visitors would also be able to plan their valley visit in advance, perhaps shortening their stay in the valley and reducing crowding.

The potential staging area location at Taft Toe, and the development of two separate shuttles would allow the current shuttle route to be converted to a simplified system, making it easier for first-time visitors to understand and use. Removal of over 75% of the vehicular traffic east of El Capitan crossover would make shuttle operations faster, more reliable, and efficient. Shuttle capacity would be increased, and on-time performance improved. Some trips that can now be made without a transfer would require transfers from one shuttle system to another, specifically trips between the lodge and points east of the village. However, point-to-point travel times would be shorter than today. Travel time from Camp 6 to Happy Isles would be approximately 11.6 minutes under each alternative.

Visitor Experience. The proposed system would reduce visitor confusion by eliminating the need for day users to drive over the complex valley road system in search of parking. A major reduction in vehicular traffic would be realized with the elimination of day use private vehicle travel. Orientation would allow visitors to plan their stay, increasing enjoyment and reducing frustration. Pedestrian and vehicular conflicts would be reduced. The urban character of the valley would be reduced by the removal of parked cars from roadsides and the elimination of private vehicle parking at valley activity areas, such as Yosemite Falls. The transfers required between shuttle systems could be viewed as inconvenient by some users, although lost time due to the existing circuitous routing of the shuttles would be eliminated for many trips. VTS vehicle movements and noise would be removed from portions of the east portion of the valley, affording a quieter and more natural experience.

Resource Impacts. The proposed shuttle routes would eliminate VTS traffic from the Stoneman, Happy Isles, and Clarks bridges. Road edge damage due to uncontrolled parking and walking in sensitive areas would be eliminated. Social trail formation would be reduced by focussing visitor access in concentrated areas where movements can be managed, and by providing advance orientation. Visitor activity and vehicular movements would be confined to a single corridor, and wildlife access to the Merced River would be opened along the north bank. Parking would be removed from some visitor use areas, allowing them to be restored to a natural state. Views from Glacier Point could be improved by the removal of some of the parking facilities.

The alternatives all require the disturbance of a large area of ground south of Southside Drive road at the El Capitan crossover. Up to 1,800 parking spaces would be required and 22 acres would be removed from natural habitat within the park. Resource disturbance and visual disruption would be limited due to the staging areas' distance (.25 to .50 miles) from the Merced River, elevation above the flood plain, and screening by thick forest at the road edge. Offsetting the need for newly disturbed land would be the removal of private vehicular traffic from between 4.5 and 6.5 miles of roadway in the valley and the removal of at least 1,800 parking spaces from the east end of the valley. Day use visitor traffic would be eliminated from over 10 miles of valley roadways.

Consistency With Park Service and Regional Planning Goals. The visitor transportation systems and staging area allow the goals of the general management plan to be met while affording reasonable access to the park. Opportunities to coordinate the transportation system with regional transit service from Merced and Mariposa would be available at either Camp 6 or Taft Toe. The alternatives would allow existing impacts to the wild and scenic Merced River to be reduced. The relocation and reorientation of facilities prescribed in the general management plan and the concession services plan would be enhanced by the proposed VTS alternatives. Opportunities to further consolidate visitor facilities would be available, but the alternatives could accommodate the current location of facilities in the interim.

Cost and Cost Effectiveness. Each option represents a significant increase in VTS service, facilities, equipment, and cost. The present use of surcharges on concession goods and services would not be adequate to fund the expanded systems. The resulting surcharges would be too high and a disproportionate share of the costs would be borne by the overnight lodging visitors, who represent only a small part of the transportation problem in the park. A new funding source, which placed more burden on the day user, would be needed. The ability to secure the necessary funding support may not be available under current NPS programs.

Implementation. The alternatives all offer the ability to phase improvements overtime and to maintain visitor access during the implementation process. The Taft Toe staging area could be constructed without disruption to the current roadway system or the existing VTS service. VTS service could be provided to existing valley facilities while maintaining opportunities to accommodate future facility relocations. VTS services could begin with bus technology and be upgraded to guideway technology at a later date without disrupting visitor access.

A day use reservation system and advanced visitor information and orientation, ideally provided in the gateway communities, would contribute to the achievement of NPS objectives while reducing visitor frustration. However, the identified alternatives would function with or without day use reservations. Law enforcement patrol and traffic control costs would be reduced with the expanded VTS service.

The alternatives could be implemented by Park Service and the concessioner; major coordination efforts with entities outside the park would not be required. However, joint transportation and visitor service planning with the gateway communities could reduce parking demand by encouraging park visitors to use transit connections originating in the gateway communities. The gateway transit service could be organized around the lodging facilities that now serve as overflow units for overnight park visitation.

All of the alternatives would require additional environmental documentation prior to construction of the Taft Toe staging area and possibly the Camp 6 transfer point. The LRT and GRT options would also require additional environmental documentation for the installation of the tracks or guideway.

Evaluation of Alternatives

The major features of each alternative are illustrated on a map at the end of the previous chapter. The chart at the end of this section provides a comparison of the alternatives for each of the evaluation categories. The most significant differences between the alternatives are discussed below.

Visitor Transportation and Management. The bus alternatives would offer the shortest wait time for visitors, since the smaller shuttle vehicles would have to be operated at a higher frequency. The travel times for the alternatives would be similar, with the elevated people mover (GRT) option offering somewhat faster service than the other options. The elevated people mover also would be free from any delays due to overnight visitor traffic. Light rail transit would be subject to some delays at road crossings. Buses would have the greatest potential for delay, since they would operate along the valley roads with visitor traffic. The travel time advantage of the elevated people mover would be offset by visitors' need to travel up to and down from the elevated stations. The bus alternatives offer a great deal of route flexibility compared to the other options, including adjustments to respond to relocated facilities and seasonal variations in service. Once constructed, the LRT and GRT options could be extended, but the routes could not be changed without substantial additional investment.

Visitor Experience. With the bus technologies available today, internal combustion engines are most likely to be the appropriate power source for the bus alternatives. As a result, the bus alternatives would be noisier than the guideway options. Special modifications can be made to buses to reduce noise to some degree. The LRT and GRT options would have an impact on the visual character of the valley. In the case of light rail transit, the overhead electrical wires would be visible from near the tracks and could interfere with views. From a distance, the wires would tend to blend into the background. The elevated structure of the GRT alternative would have a significant impact on views from near the guideway and from a distance. The guideway would likely be visible from Glacier Point. The high-tech character of the GRT alternative could conflict with the natural environment of the valley and with historic structures. The bus and LRT options would keep visitors in close contact with the surrounding environment. In contrast, the GRT alternative would give visitors unique views, but would allow less intimate contact with the surrounding environment. The vertical movement of passengers required with the GRT option would complicate the process of transporting recreation equipment for visitors. Noise and minor disruption to access and circulation could occur during the construction of the LRT and GRT alternatives.

A staging area at Taft Toe would reduce auto traffic in the valley by 77%.

Resource Impact. The LRT and GRT options would have the greatest ability to improve valley air quality. The bus options could cause localized air quality impacts, primarily from particulate and nitrogen oxide concentrations, depending on the engine technology. The LRT and GRT options would have greater impacts on habitat and would require more space in the valley due to maintenance facility needs. Buses could be stored and maintained outside the valley, but a valley location for the bus maintenance and storage facility would reduce operating costs, vehicle emissions, and traffic along park roads.

The alternatives all eliminate vehicular traffic from park roads. The LRT and GRT options have the greatest benefit in this regard. By reducing the required volume of VTS traffic, the larger LRT and GRT vehicles would reduce the potential for the disruption of wildlife by the VTS operation. The LRT and GRT options would cause wildlife disruption during construction and could result in water quality, and air quality impacts during construction. A new crossing of the Merced River would be required with the LRT option near Sentinel Bridge. The LRT and GRT options also would increase the width of transportation corridors in the valley. Site specific archeological surveys would be required prior to any ground disturbing activities pertaining to construction in roadway corridors or areas required for support facilities. The LRT route could be constructed on the road alignment with private vehicular traffic sharing the space with the LRT operation. Visual simulations of the LRT and GRT options located adjacent to the valley road system are included with the map and charts that define the valley VTS alternatives.

Consistency With Park Service and Regional Planning Goals. The alternatives would all contribute to the reducing the influence of vehicles in the valley. The LRT and GRT options require fewer vehicles and are electrically powered. The two fixed-guideway alternatives require major construction within the Merced River wild and scenic river corridor.

Cost and Cost-Effectiveness. The bus alternatives offer the lowest capital cost, since they do not require the construction of a guideway system. The LRT option is next in cost, with the GRT system being by far the most costly option to construct. The LRT and GRT options would require fewer operators in the case of the LRT option and no vehicle operators for the GRT option. Each alternative serves the same level of ridership, so that the cost per rider would be lowest for the bus options, higher for the LRT option, and highest for the GRT option. Table 12 summarizes the cost for two bus alternatives and the LRT and GRT options. A more detailed summary of the cost estimates are presented in appendix 6.

Implementation. The alternatives all would require comprehensive environmental documentation prior to construction of the staging area. The LRT and GRT options would also require environmental documentation for their guideway systems. Implementation of the bus alternatives could be undertaken by the current concessioner, since they represent an expansion of the existing system. The other options would require specialized expertise. The LRT and GRT options would also require the valley's electrical service and distribution systems to be upgraded. Construction staging and visitor traffic control would need to be carefully planned for the LRT and GRT options. Construction crew housing would be required for these options, as well. Environmental documentation, engineering, and construction would take a minimum of five years for the guideway options.

Table 12: Cost Summary for Yosemite Valley VTS Alternatives

Cost Element	Standard Bus	Articulated Bus/ Passenger Tram	Light Rail Transit	Group Rapid Transit
Construction and Equipment (millions)	$26.4	$26.2	$279.1	$458.5
Annual Operating and Maintenance (millions)	$4.7	$3.3	$5.9	$5.3
Annual GMP Visitors	4,049,502	4,049,502	4,049,502	4,049,502
Annualized Cost per Visitor	$1.76	$1.38	$7.05	$10.51

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision of planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

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EVALUATION SUMMARY CHART

MARIPOSA GROVE ACCESS ALTERNATIVES

	Goat Meadow Shuttle Staging Area	**Wawona Shuttle Staging Area**	**Grizzly Giant Parking Area**
Visitor Transportation and Management	• Increases overall visitor length of stay • Average visitor delay = 24 minutes • Distributes grove visitation equally over time • Concentrates visitors into groups • Reduces vehicular circulation and congestion at south entrance intersection • May require independent Wawona Campground/Hotel shuttle	• Greatest Increase in overall visitor length of stay • Average visitor delay = 36 minutes • Distributes grove visitation equally over time • Concentrates visitors into groups • Reduces vehicular circulation and congestion at south entrance intersection • Intensifies activity in busy Wawona area • Long back-tracking for some trips	• Most direct visitor access to Grove • Average visitor delay = 0 Minutes • Less control over visitor arrival times at grove • Smaller visitor groups • Requires traffic management at south entrance intersection • May require independent Wawona Campground/Hotel shuttle
Visitor Experience	• Less convenient access to grove • Increases perception of crowding in grove • Increases shuttle-related noise in grove • Reduces crowding in Wawona area	• Less convenient access to grove • Increases perception of crowding in grove • Increases shuttle-related noise in grove and on route to Wawona	• Most convenient visitor access to grove • Reduces crowding in Wawona area
Resource Impact	• Space requirements for parking and visitor facilities = 3.3 acres • Increases auto VMT by 620 miles per day • Bus VMT = 1,133 miles per day • Particulate and NO_x emissions would increase • Restores natural habit and decreases soil erosion in lower grove • Soil erosion and habitat disturbance on U.S. Forest Service land • Maintenance facility requires 10,700 square feet (s.f.)	• Space requirements for parking and visitor facilities = 4.0 acres • Reduces auto VMT by 3,498 miles per day • Bus VMT = 1,805 miles per day • Particulate and NO_x emissions could increase • Restores natural habit and decreases soil erosion in lower grove • Soil erosion and habitat disturbance on NPS land • Potential staging area sites have meadow, meadow edge or wild and scenic river impacts • Maintenance facility requires 11,671 square feet (s.f.)	• Space requirements for parking and visitor facilities = 2.5 acres • Bus VMT = 381 per day • New development in archeological district Minimizes development in lower grove • Restores the most natural habitat and decreases soil erosion in lower grove • Requires .75 mile of new road and stream crossing • Staging area located on previously undisturbed land • New maintenance facility not required
Consistency With Park Service and Regional Planning Goals	• Relocates activity development outside park boundary	• Potential traffic, activity and noise impacts to private inholdings • Intensifies activity in Wawona development area	• Previously recommended in draft development concept plan
Cost and Cost Effectiveness	• Higher cost than Grizzly Giant for parking construction, bus fleet and bus operating cost	• Most costly for parking construction, bus fleet and bus operating cost.	• Least costly • Operating costs of shuttle could be covered by hotel surcharge
Implementation	• Requires coordination with U.S. Forest Service • Requires relocation of south entrance station • Creates new area for law enforcement and resource protection • May require less extensive environmental documentation • Number of transportation employees = 21	• Relocation of south entrance station recommended • Requires environmental documentation • Number of transportation employees = 25	• Relocation of south entrance station recommended • Requires completion of environmental documentation • Number of transportation employees = 7

EVALUATION SUMMARY CHART

TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVES

	Designated Staging Area and Mandatory VTS Shuttle Services	**Designated Staging Area and Voluntary VTS Shuttle Services**
Visitor Transportation and Management	• Consolidates and simplifies day use visitor parking • Improves access to shuttle by providing designated parking area • Eliminates direct private vehicle access to visitor activity areas • Increases travel distance for visitors from west • Organizes visitor distribution • Reduces pedestrian/traffic conflicts • Reduces traffic circulation	• Improves access to shuttle by providing designated parking area • Maintains limited direct private vehicle access to visitor activity areas • May encourage circulation to find parking spaces • Visitor and vehicle activity more dispersed
Visitor Experience	• Simplifies parking and access to shuttle system • Reduces visitor confusion and uncertainty • Eliminates visual disruption of parked vehicles in road corridor • Increases access time and walking distances to some locations • Requires transfer of recreational equipement to shuttle for all users	• May be more convenient for some visitors • Provides backup parking to primary access points • Requires transfer of recreational equipment to shuttle for some users • Eliminates some visual disruption of parked vehicles in road corridor • May increase access time and walking distances to some locations
Resource Impact	• Space requirements for parking and visitor facilities = 7.5 acres • Eliminates habitat, soil erosion, and water quality impacts by removing road edge and trailhead parking • Removes parking from wild and scenic river corridor • Maintenance facility requires 19,770 square feet (s.f.)	• Space requirements for parking and visitor facilities = 5.1 acres • Reduces habitat, soil erosion, and water quality impacts by removing road edge and informal trailhead parking • Reduces parking in wild and scenic river corridor • Maintenance facility requires 15,088 square feet (s.f.)
Consistency With Park Service and Regional Planning Goals	• Development concept plan planned for area • Reduces wild and scenic river impact	• Development concept plan planned for area • Some reduction in wild and scenic river impacts • Lower cost
Cost and Cost Effectiveness	• Most costly option	• Less costly alternative
Implementation	• Simplifies parking and traffic enforcement • Number of transportation employees = 49 • Easiest management of visitor limits	• Multiple areas to enforce parking restrictions • Difficult to contain parking in designated activity lots • Number of transportation employees = 39 • Requires promotion to encourage visitor use • Improved management of visitor limits

EVALUATION SUMMARY CHART

YOSEMITE VALLEY VTS ALTERNATIVES

	Bus Transit	**Light Rail Transit**	**Elevated People Mover Transit**
Visitor Transportation and Management	• Reduces private vehicle/ VTS conflicts • Maximum route flexibility • Some potential for VTS delays from visitor traffic • Connector wait time = 1.0 minute (standard bus) to 1.5 minutes (articulated bus) • Circulator wait time = 2.0 minutes (standard bus) to 3.0 minutes (articulated bus) • Travel time, Camp 6 - Taft Toe = 10.1 minutes	• Major reduction in private vehicle/VTS conflicts • Inflexible alignment • Minor potential for VTS delays at visitor traffic crossings • Connector wait time = 2.5 minutes • Circulator wait time = 3.75 minutes • Travel time, Camp 6 to Taft Toe = 10.1 minutes	• Eliminates private vehicle/VTS conflicts • Requires vertical circulation of passengers • Inflexible alignment and stations • No delays from visitor traffic • Connector wait time = 3.0 minutes • Circulator wait time = 5.0 minutes • Travel time, Camp 6 to Taft Toe = 9.3 minutes
Visitor Experience	• May increase VTS related noise • Visual impact limited to vehicle presence • Maintains close contact with immediate environment • Frequent vehicle passage along VTS route	• System may have novelty appeal to visitors • Reduces VTS-related noise • Overhead power wires may disrupt views from valley floor • Maintains close contact with immediate environment • Noise impacts during construction • Visitor access disrupted during construction	• System has strong novelty value • Reduces VTS related noise • Trip time lengthened by station access • Elevated guideway structure will disrupt views from valley floor and Glacier Point • Character may conflict with natural environment • Provides unique viewpoints from elevated guideway • Reduces contact with immediate environment • More difficult to transport recreation equipment • Noise impacts during construction • Visitor access disrupted during construction
Resource Impact	• Conventional bus maintenance facility requirements = 35,146 s.f. (could be located outside Valley) • Articulated bus maintenance Facility space requires 30,822 s.f. (could be located outside Valley) • Eliminates VTS traffic from 2.5 miles of road • Increases VTS/wildlife conflicts • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	• Eliminates VTS emissions • Maintenance facility space requires 44,480 s.f. (must be located in Valley) • Eliminates VTS traffic from 2.5 miles of road • Reduces VTS/wildlife conflicts • Eliminates VTS impact on water quality • May require new river crossing at Sentinel Bridge • May increase transportation corridor width required • Extensive construction in archeological district • Habitat disruption during construction • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	• Eliminates VTS emissions • Maintenance facility requires 35,430 s.f. (must be located in valley) • Eliminates VTS traffic from all roads • Eliminates VTS/wildlife conflicts • Eliminates VTS impact on water quality • Habitat disruptions at pier locations • Extensive construction in archeological district • Habitat disruption during construction • Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)
Consistency With Park Service and Regional Planning Goals	• Reduces vehicle influence in Valley	• Major reduction in vehicle influence within valley • Requires new construction within designated wild and scenic river corridor	• Major reduction in vehicle influence within valley • Requires new construction within designated wild and scenic river corridor
Cost and Cost Effectiveness	• May require additional road repair • Lowest capital cost • Highest operating cost	• Very high capital cost • Lower operating cost than standard bus	• Highest capital cost • Lowest operating cost
Implementation	• Number of transportation employees = 92 (conventional bus) • Number of transportation employees = 66 (articulated bus) • Turnkey implementation possible with existing concessioner • System implementation may not require environmental documentation	• Number of transportation employees = 47 • Requires some special skills for advanced technology • Requires specialized construction expertise • System implementation would require environmental documentation • Construction crew housing required • Requires existing electrical service to be upgraded	• Number of transportation employees = 36 • Requires highly specialized skills for advanced technology • Requires specialized construction expertise • System implementation would require environmental documentation • Construction crew housing required • Requires existing electrical service to be upgraded

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IMPLEMENTATION ISSUES

The implementation of improved visitor transportation systems at Yosemite would begin with the preparation of an initial program management plan. This plan would set forth the planning, design, and environmental compliance steps necessary to define preferred solutions in each of the activity areas and to gain the necessary approvals for the preferred alternatives. The plan would also lay out a process for identifying the necessary funding for the required construction projects and a financing plan for each. The plan would include a schedule and would identify responsibilities for each stage in the implementation program, beginning with more in-depth planning studies and culminating with the construction of new facilities and operation of the new systems.

The following paragraphs identify the key elements of a program management plan for improved Yosemite VTS service. The plan elements follow the basic approach used in the development of federally funded urban transit systems and could form the basis of a standard NPS process for identifying and evaluating VTS needs service wide. Similar steps would be required in each activity area, with varying levels of complexity.

CONCEPTUAL ENGINEERING AND ALTERNATIVES ANALYSIS

The initial step of the implementation process would be to compile information on existing topography, soils, environmental baseline conditions, and other material to support the conceptual design of each alternative and the initial assessment of the environmental effects of each. Plan and profile drawings would be developed for any guideway alternatives, needed roadway improvements would be identified for bus alternatives, and a detailed operating plan would be developed for each. The location, size, and type of visitor facilities, maintenance facilities, and other features identified in this study would be refined and conceptual layouts produced. Operational tests of alternative buses should be undertaken to identify the most appropriate models for use on Yosemite's roads.

Conceptual cost estimates would be compared to identify the most cost effective options. The environmental impacts of the construction and operation of each alternative would be estimated and compared, along with assessments of each alternative's contribution to visitor experience and the achievement of park objectives.

The relationship between the transportation of visitors and the carrying capacity of park resources is an extremely significant element of the evaluation of the alternatives. Carrying capacity should be considered from the perspective of physical damage to natural and cultural resources and from the viewpoint of visitor experience. The contribution of each transportation alternative to the experience in Yosemite also will be significant to the ultimate choice among the available options. The need to modify existing visitor facilities and provide improved information, orientation, and interpretive services would be defined in detail at this stage of the development process.

The product of this step would be a definition of the preferred alternative for each activity area in the park, a more definitive cost estimate for the transportation systems, and preliminary financing plans for each area. This information could be used to compare proposed improvements at Yosemite with other needs in the national park system to develop priorities for NPS funding allocations.

Depending on the alternatives selected to address Yosemite's visitor transportation needs, additional design and environmental compliance effort may be required. The remaining portion of this section describes possible implementation steps for fixed-guideway transit systems that may be selected. Bus alternatives that use the existing park roads would not require the same implementation steps.

PRELIMINARY ENGINEERING AND FINAL ENVIRONMENTAL DOCUMENTATION

In this step of the process, the design of the proposed improvements would be developed in more detail to confirm the alignment, profile, requirements for structures, and the location and design of fixed facilities. Approximately 30% of the design work needed to produce construction contract documents would be completed at this stage of the project. Performance specifications would be prepared for the equipment needed to operate the system.

The greater level of detail available at this stage of the design process would allow environmental impacts of the proposed improvement to be determined with confidence, and would permit mitigation measures to be identified and included in the design. Final environmental documentation would be prepared at this time. Cost estimates prepared at this stage would have a greater level of accuracy.

FINAL DESIGN, CONSTRUCTION, OPERATIONS

At this stage of the project development process, a number of options would be available for moving the project forward if the necessary funding were secured. Adequate project definition would now be available to turn all or portions of the project over to a contractor or set of contractors, if that approach offered significant advantages with respect to cost or implementation schedule. The implementation strategy could follow one of four models:

- traditional model
- design/build model
- turnkey model
- super turnkey model

Traditional Project Implementation

The traditional approach to developing public works projects has involved separating the final design and construction tasks from one another. Construction documents and detailed equipment specifications for all elements of the project are prepared under the direction of the project owner. The project is split into packages and competitive bids are taken for constructed facilities and for equipment items. In some cases, a single general contract is bid, but more often a number of individual elements of the project are bid separately. The owner or a representative of the owner is then responsible for coordinating the work of the individual contractors.

Design/Build

The design/build model for project development involves splitting the project into distinct packages at the completion of preliminary engineering. Competitive bids are taken for the completion of design and construction of fixed facilities based on the preliminary engineering design and for the design and manufacture of equipment based on a performance specification. This approach potentially allows the contractors to contribute to the design process, perhaps identifying cost-saving design changes. This approach also internalizes any conflicts between the design intent and any unexpected conditions during construction within a single contracting entity. The owner is still responsible for coordinating the activities of the different contractors to deliver a completed project.

Turnkey

The turnkey contracting model involves taking competitive bids on a single contract package that includes all the elements necessary to deliver the completed project. The turnkey contract also may include the operation of the completed project for a specified number of years. The presumed advantage of this approach is that a single point of responsibility is identified for delivering a completed, successful project. The risk of coordinating the elements of the project is removed from the owner and placed on the contractor. Turnkey contracts usually are based on a firm fixed price for which the contractor agrees to deliver the finished project. While risk is transferred to the contractor, the owner gives up a good deal of control over the process in this model.

Super Turnkey

The super turnkey model can be used if the contractor has a potential ownership interest in all or portions of the system. Within the National Park Service, the development of fixed facilities within park units by concessioners is a form of super turnkey project implementation. In the case of a VTS project, a park concessioner could undertake the project on a super turnkey basis. The concessioner could retain ownership of the system for a specified number of years and have the rights to operate the system, collecting fares and using the system to support other concession services. The National Park Service could share in system revenues through provisions in the super turnkey contract. Alternatively, the National Park Service could agree to subsidize the concessioner operation of the system in order to keep user costs low.

Turnkey and super turnkey project implementation has received a great deal of interest in the last few years. Transit proposals involving these innovative approaches include systems in Houston and Honolulu. To date, a transit project has not been successfully completed using the turnkey or super turnkey approach.

In Yosemite, each of the available approaches has advantages and drawbacks. At the feasibility study stage, it is not necessary to identify a preferred approach. If a VTS project proceeds into preliminary engineering, a formal evaluation of the available implementation strategies should be made. Factors to consider in choosing an approach include the cost of the project, the degree of risk and liability and the way in which risk is shared among the parties, the degree of control that the Park Service can exercise over the project, the time schedule for completion of the project, the quality of the resulting system, the ability of the Park Service to manage the project, and other factors specific to Yosemite National Park.

STAGED IMPROVEMENT TO YOSEMITE VTS SERVICES

Opportunities to phase in improvements to VTS service exist in the Mariposa Grove/Wawona area and Yosemite Valley. Until adequate parking space can be provided for access to the visitor transportation system in Tuolumne Meadows, little can be done to improve visitor access and reduce the existing traffic conflicts and ongoing resource damage. The new staging area proposed in this study can be constructed without impact to the current shuttle operation and pattern of visitor use in Tuolumne Meadows.

Mariposa Grove Staged Improvements

The existing visitor confusion and traffic conflicts associated with grove access could be reduced through improved signage and development of a more reliable shuttle schedule. Signage improvements which should be considered include providing directional signage at the grove access road intersection indicating when the grove access road is closed. A simple system involving a rotating sign panel could be used to eliminate visitor turns toward the grove that are followed by U-turns at the access gate. Signs should also be provided at Wawona to clarify the location of the shuttle boarding area and the schedule of service for the shuttle. A specific vehicle assignment should be made to the Wawona shuttle system and a schedule developed that provides for vehicle arrivals at regular intervals. The schedule should be communicated to visitors through signs and printed material. Service to the campground should be formalized or eliminated.

Each of the potential staging areas and shuttle services can be developed without major impact to the current operation. Relocation of the south entrance station, required for the Goat Meadow alternative and recommended for the other options, would need to be staged carefully to maintain visitor access to the park along California Highway 41.

Yosemite Valley Staged Improvements

The valley transportation system recommendations focus on reduction of day use trips into the valley and simplification of the existing valley shuttle bus system to provide more efficient service. Concurrent with these service improvements are significant opportunities to eliminate daily vehicle use of some valley roads and bridges and to relocate visitor facilities to allow meadow and other habitat resource reclamation.

All day use visitors entering the valley by private automobile would be directed into the Taft Toe staging area at the west end of the valley. Visitors would receive park information, verify reservations, and receive park resource interpretation at a new visitor center that would replace or supplement the existing facility in the village. Visitors would then board the valley connector, which would provide access to Yellow Pine/Sentinel Beach, the chapel, Yosemite Village, and Yosemite Lodge via Southside Drive and Sentinel Bridge. The valley connector could be initiated with buses and be upgraded over time to a light rail transit or other guideway system. Tour buses would not be required to stop at Taft toe, but could proceed on to Camp 6. The valley connector would provide the opportunity to close portions of Northside Drive to visitor traffic, facilitating habitat rejuvenation and wildlife access to the river edge and meadows, and eliminating existing pedestrian social trails in the area.

The valley circulator would provide local access to activity areas within the village and east valley area, similar to the existing shuttle service. The valley connector and the valley circulator would interface at a transfer center to be developed at Camp 6, adjacent to the village center.

Simplifying the valley circulator would provide additional service and shorter trips among east valley activity centers and would allow the elimination of visitor traffic from some valley roads and bridges. Relocation of the Upper and Lower River campgrounds and the stables would allow meadow and habitat reclamation.

The implementation of this transportation system in Yosemite could be accomplished in three stages, as outlined below and illustrated on the accompanying maps located at the end of this chapter.

Stage I

- Develop Taft Toe staging area, including relocation of the visitor information center from Yosemite Village.
- Implement valley connector on alignment of Southside Drive (or, modified to be raised out of meadows along south hillside) to connect the Taft Toe staging area with Yosemite Lodge.
- Implement valley circulator between the Ahwahnee Hotel and Happy Isles via Housekeeping Camp, Curry Village and the campgrounds. Return shuttle via stables.
- Develop shuttle transfer point and tour bus parking at Camp 6.
- Relocate main valley visitor store to Curry Village. Maintain store for employees and some visitors at Yosemite Village.
- Eliminate visitor traffic on the Northside Drive between El Capitan crossover and Yosemite Lodge. Maintain emergency and service vehicle accessibility. Use for pedestrian and bicycle circulation and access to north side valley attractions.

Stage II

- Relocate Upper and Lower River campgrounds to locations east of Curry Village and/or north of Upper Pines campground. Restore campground areas to natural conditions.

- Eliminate all traffic on Stoneman Bridge road between Curry Village and the Yosemite Village intersection.

Stage III

- Widen Southside Drive to four lanes from Pohono Bridge to the El Capitan crossover.
- Eliminate visitor traffic from Northside Drive between El Capitan crossover to Pohono Bridge.
- Provide designated El Capitan viewing and climber access parking area on north side of El Capitan crossover.
- Relocate stables to south of Merced River in a location to be determined. Restore stables area to natural condition.
- Relocate group camp and North Pines campgrounds to area near relocated River campgrounds and restore area to natural conditions.
- Terminate valley circulator traffic at Happy Isles or at existing Mirror Lake shuttle stop.

RELATED VISITOR MANAGEMENT MEASURES

The majority of the transportation impacts in the major activity areas in Yosemite are associated with day use visitation. Visitation levels are estimated to be at or near the prescribed daily levels at Mariposa Grove and on peak summer weekends in the valley and Tuolumne Meadows. The enforcement of GMP visitation goals is difficult in the valley and at Tuolumne Meadows due to dispersed parking areas and the lack of an effective control point where entries and exits can be monitored. Mariposa Grove offers a more manageable situation, with a parking lot of limited size and the opportunity to provide supplemental shuttle service with a capacity matched to the GMP visitation goal.

A day use reservation system has been identified as a future measure to aid in the management of visitor use. Without adequate provisions for checking traffic entering the activity areas to confirm both overnight and day reservations, and a safe and efficient means of diverting traffic to areas of lower use or out of the park, a reservation system can not be practically and safely implemented. The best way to implement a day use reservation system would be to provide controlled access points to the primary activity areas. The access points would be served by parking areas sized to correspond to the applicable visitor volume. A reservation system would be an effective supplement to a system of appropriately designed control points. Reservation systems could be used to reduce the visitor frustration caused by being unexpectedly turned away from activity areas. They would also cut down on unnecessary travel into and through the park.

The positive impacts of a day use reservation system and the effectiveness of the existing reservation systems for overnight visitors could be enhanced by providing real-time information on the status of Yosemite's activity areas and overnight accommodations in the gateway communities, such as Oakhurst, Mariposa, Lee Vining and Groveland. These locations would afford visitors opportunities to easily change their travel routes, park entry points, or overnight plans. Providing information on park accessibility and the ability for visitors to make next day reservations could eliminate unnecessary travel and support the economic development objectives of the communities. A joint project of the five counties surrounding Yosemite, the Park Service and the California Department of Transportation will begin the installation of advanced traveller information systems in the Yosemite region.

The gateway communities now provide supplemental overnight lodging for visitors who would otherwise stay in the park. As visitation to Yosemite increase, more visitors are expected to stay overnight in the gateway communities. This group of visitors could be served effectively by a shuttle system connecting the lodging facilities in the gateway cities to the proposed VTS staging in the park. The successful implementation of shuttle systems serving overnight guests outside the park could reduce the number of parking spaces required at the park staging areas.

FUNDING OPTIONS

The potential funding sources for VTS improvements at Yosemite include annual appropriations as part of the park's operating budget, programs within the Intermodal Surface Transportation Efficiency Act, a new and as yet undefined NPS program for visitor transportation systems, the park visitors (in the form of entrance fees or fares) and the private sector. Private sector involvement would be predicated on the potential to recover their investment through user charges and/or subsidies. The present system of surcharges on concessioner goods and services would not be adequate to support the operation of any of the transportation systems described in this report.

The annualized capital, operational, and maintenance cost of the valley alternatives ranges from $5.6 million for a system using an articulated bus fleet, to approximately $42.5 million for the GRT alternative. This compares to a 1992 budget of $1.3 million for the valley shuttle. VTS systems in the other activity areas would be less costly, but still would require new, dedicated funding sources.

The likelihood of securing funding for the LRT or GRT alternatives in the valley is low, considering current policies and funding sources, unless the private sector were allowed to collect fares high enough to support a turnkey implementation of one of the systems. However, on a per-passenger basis, the overall cost of the system would not be unreasonable.

At present, a servicewide policy regarding visitor transportation system development and funding is not in place. The need for such a policy is evident from the results of this study and the companion efforts at Yellowstone National Park and Denali National Park and Preserve. The funding required to support any of the proposed alternatives is beyond the current resources of Yosemite National Park.

No formal VTS program presently exists to address visitor transportation needs at Yosemite or other units of the national park system. Decisions at Yosemite and other parks are made on an individual basis, considering the availability of funds and competing needs in each park. At present, no mechanism exists to allow the private sector to recover the costs of VTS development. Several opportunities for turnkey implementation of transportation systems have been identified and could go forward if a means of collecting reasonable user fees through entrance charges could be developed.

The movement of visitors is one of the most significant aspects of the management of park units. This study and others have identified the importance of the Park Services role in planning for and managing visitor use. Transportation systems offer a way to manage visitor movements while enhancing the interpretation of park resources and enjoyment of the visitors. Systems that complement private vehicle travel are most appropriate in areas of high use and special resource sensitivity, like Yosemite. The successful operation of a voluntary system at Yosemite over a period of more than 20 years serves as a model for other parks. Experience at Yosemite provides substantial evidence that given an attractive service, visitors will choose to ride a visitor transportation system.

Volume I of the Alternative Modes Feasibility Study contains a more in-depth discussion of these issues and VTS program needs within the National Park Service. It is apparent that alternative transportation modes are not only a feasible alternative to private vehicle travel, but a superior option in a number of park settings.

Notes:

1. Based on year 2000 running exhaust emission factors at 75°F in "Methodology for Estimating Emissions from On-Road Motor Vehicles, Volume I: EMFAC7F" Draft Report, State of California Air Resources Board Technical Support Division, June 1993.

2. Environmental Assessment, Development Concept Plan Draft, South Entrance/Mariposa Grove, Feb. 1987.

3. *Visitors, Alternative Futures, and Recreational Displacement at Yosemite National Park*, James H. Gramann, Texas A&M University, 1992.

4. *Visitors, Alternative Futures, and Recreational Displacement at Yosemite National Park*, James H. Gramann, Texas A&M University, 1992.

5. *Visitors, Alternative Futures, and Recreational Displacement at Yosemite National Park*, James H. Gramann, Texas A&M University, 1992.

6. Based on year 2000 running exhaust emission factors at 75°F in "Methodology for Estimating Emissions from On-Road Motor Vehicles, Volume I: EMFAC7F" Draft Report, State of California Air Resources Board Technical Support Division June 1993

7. *Yosemite Transportation Strategy*, the Wilderness Society, 1992.

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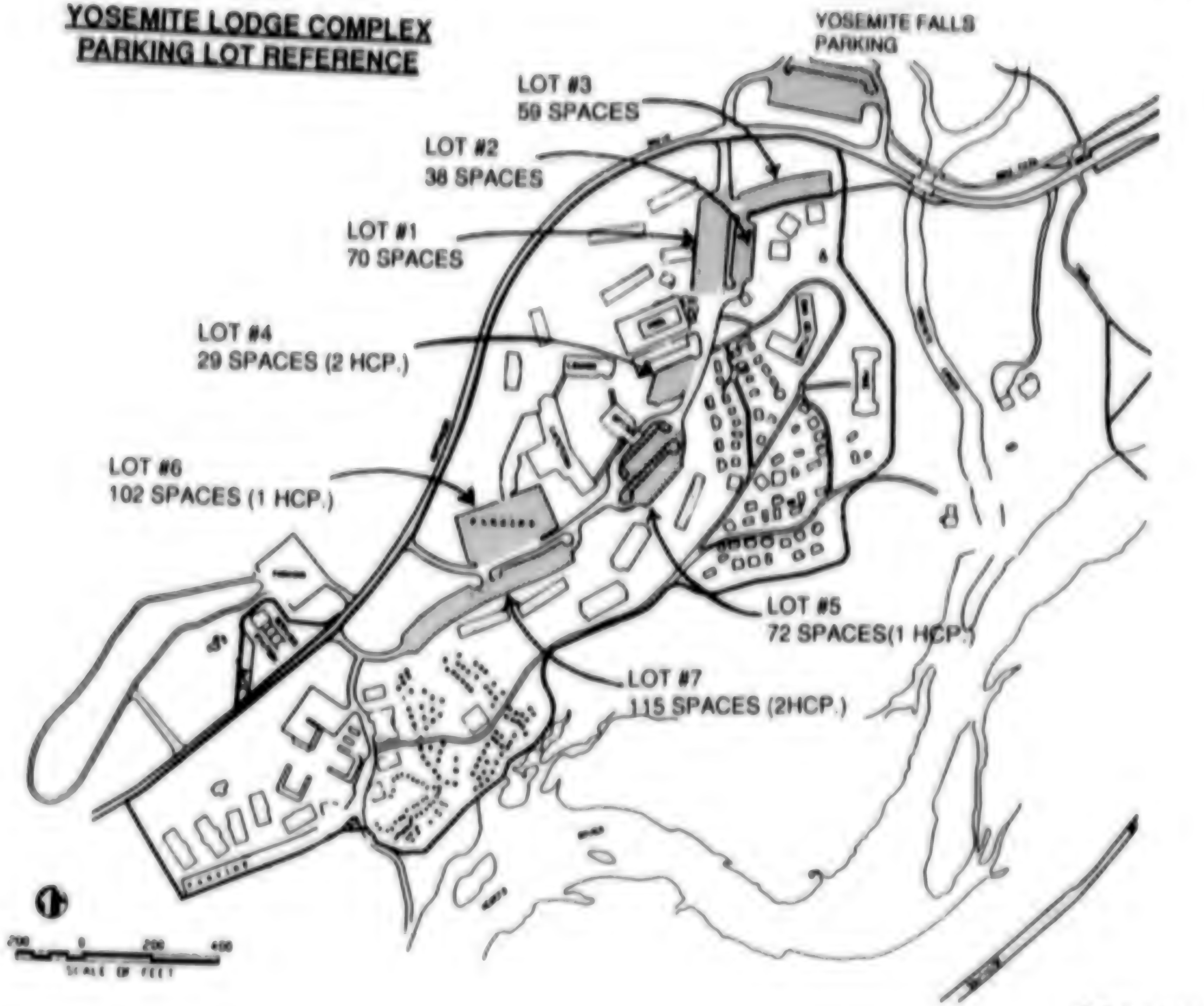
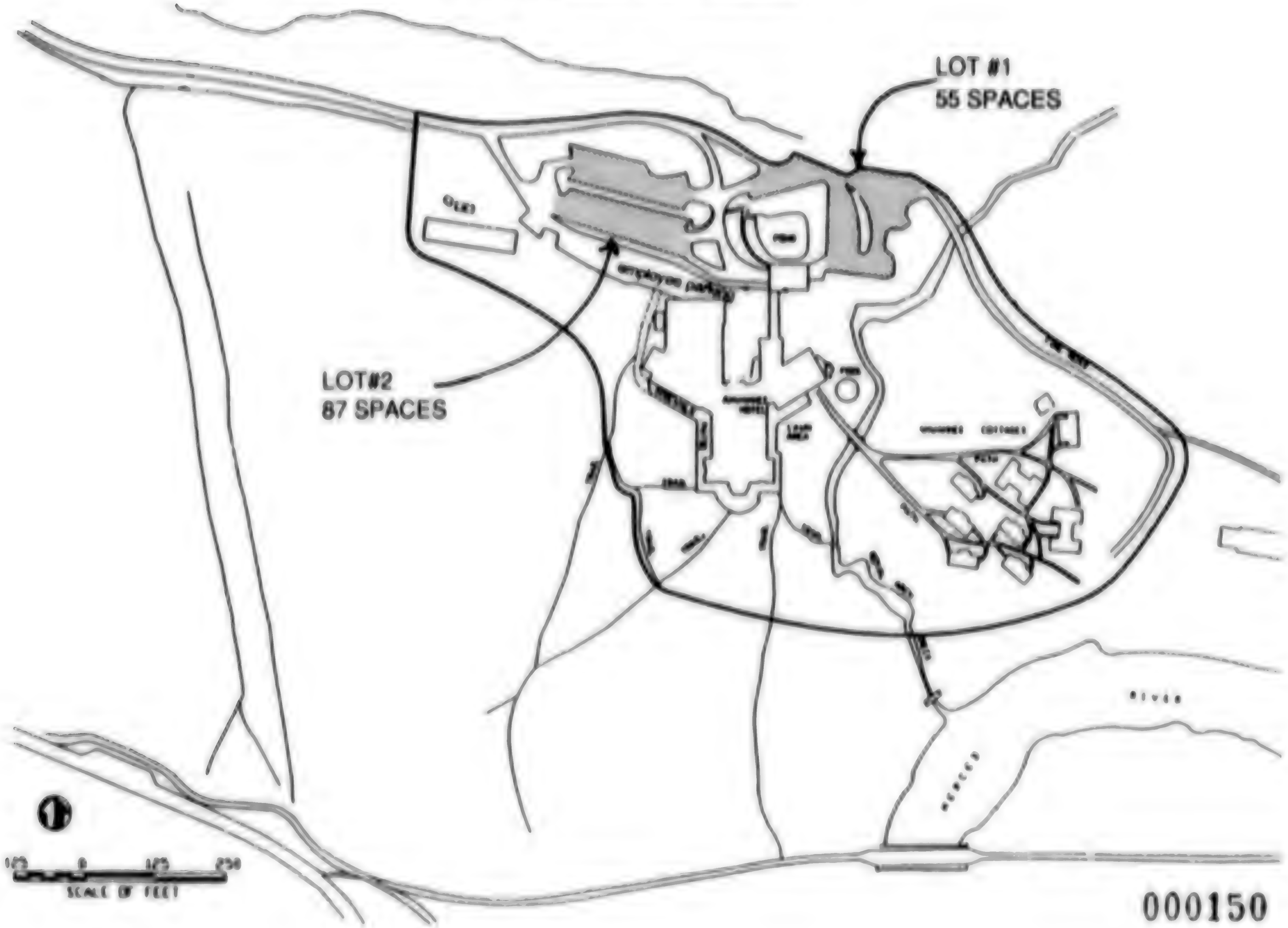
Appendix 1: Yosemite Parking Area Layouts

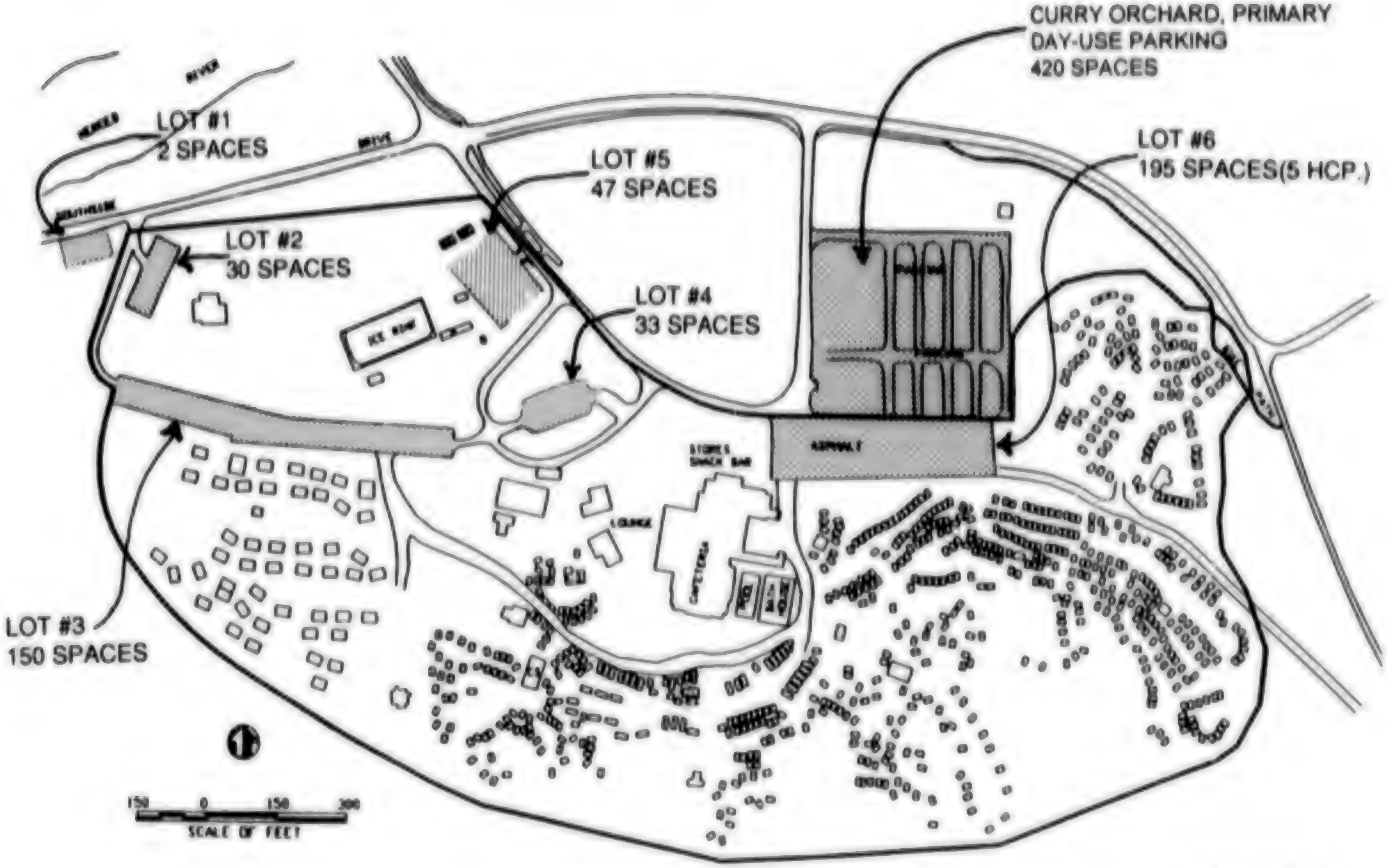
YOSEMITE LODGE COMPLEX
PARKING LOT REFERENCE



AHWAHNEE HOTEL COMPLEX PARKING LOT REFERENCE



CURRY VILLAGE/ CAMP CURRY COMPLEX PARKING LOT REFERENCE



Appendix 2: Yosemite Parking Area Occupancy Summaries

Yosemite National Park – Parking Occupancy Summary
Wawona and Mariposa Grove

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Mariposa Grove,	126	Fri 10:30 am	114	90%	0 RV's,4 Buses
Main Parking Lot	(6 Bus)	Fri 11:40 am	105	83%	3 Buses, Grove Rd. Closed
		Fri 12:35 pm	84	67%	3 Buses
(grove visitor)		Fri 1:33 pm	103	82%	6 Buses
		Fri 2:45 pm	95	75%	5 Buses, Grove Rd. Closed
		Fri 3:45 pm	111	88%	3 RV's,5 Buses
		Fri 4:35 pm	108	86%	3 RV's,2 Buses
		Fri 5:25 pm	113	90%	1 Bus
Avg. Occupancy			104	83%	
South Entrance North	17	Fri 10:30 am	2	12%	
Parking Lot, Grove		Fri 11:40 am	28	165%	2 RV's, Grove Rd. Closed
Shuttle Staging Area		Fri 12:35 pm	20	118%	2 RV's
		Fri 1:33 pm	10	59%	2 RV's
(grove visitor, gen. visitor)		Fri 2:45 pm	22	129%	2 RV's, Grove Rd. Closed
		Fri 3:45 pm	10	59%	2 RV's
		Fri 4:35 pm	3	18%	1 RV's
Avg. Occupancy			14	80%	
South Entrance South	9	Fri 10:30 am	3	33%	
Parking Lot, Grove		Fri 11:40 am	8	89%	Grove Rd. Closed
Shuttle Staging Area		Fri 12:35 pm	8	89%	
		Fri 1:33 pm	6	67%	
(grove visitor, gen.		Fri 2:45 pm	9	100%	Grove Rd. Closed
visitor)		Fri 3:45 pm	2	22%	
		Fri 4:35 pm	2	22%	
Avg. Occupancy			5	60%	
Wawona Hotel	51	Fri 10:30 am	44	86%	
Main Parking Lot		Fri 11:40 am	41	80%	Grove Rd. Closed
		Fri 12:35 pm	50	98%	
		Fri 1:33 pm	50	98%	
(hotel guest, golfer,		Fri 2:45 pm	50	98%	Grove Rd. Closed
gen. visitor)		Fri 3:45 pm	50	98%	
		Fri 4:35 pm	49	96%	
Avg. Occupancy			48	94%	
Wawona Hotel	6	Fri 10:30 am	5	83%	
Loading Zone, Front		Fri 11:40 am	0	0%	Grove Rd. Closed
Entrance		Fri 12:35 pm	2	33%	
		Fri 1:33 pm	2	33%	
(hotel guest, golfer,		Fri 2:45 pm	1	17%	Grove Rd. Closed
gen. visitor)		Fri 3:45 pm	1	17%	
		Fri 4:35 pm	2	33%	
Avg. Occupancy			2	31%	

Yosemite National Park – Parking Occupancy Summary

Wawona and Mariposa Grove

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Wawona Hotel,	18	Fri 10:30 am	11	61%	1 RV
Next to Tennis Courts		Fri 11:40 am	11	61%	Grove Rd. Closed
Entrance		Fri 12:35 pm	17	94%	
		Fri 1:33 pm	17	94%	
(hotel guest, golfer,		Fri 2:45 pm	8	44%	Grove Rd. Closed
gen. visitor)		Fri 3:45 pm	15	83%	
		Fri 4:35 pm	13	72%	
Avg. Occupancy			13	73%	
Wawona Hotel,	32	Fri 10:30 am	24	75%	1 RV
Side Lot		Fri 11:40 am	23	72%	Grove Rd. Closed
		Fri 12:35 pm	26	81%	
(hotel guest, golfer,		Fri 1:33 pm	27	84%	1 RV
gen. visitor)		Fri 2:45 pm	19	59%	1 RV, Grove Rd. Closed
		Fri 3:45 pm	21	66%	1 RV
		Fri 4:35 pm	28	88%	1 RV
Avg. Occupancy			24	75%	
Wawona Store,	87	Fri 10:30 am	40	46%	3 RV's
Grove Shuttle		Fri 11:40 am	79	91%	4 RV's, 1 Bus, Grove Rd. Closed
Staging Area		Fri 12:35 pm	89	102%	5 RV's, 1 Bus
		Fri 1:33 pm	87	100%	4 RV's
(customer, grove		Fri 2:45 pm	81	93%	5 RV's, 1 Bus, Grove Rd. Closed
visitor, history center		Fri 3:45 pm	68	78%	4 RV's
visitor)		Fri 4:35 pm	43	49%	1 RV
Avg. Occupancy			70	80%	
Strip Parking Across	60	Fri 10:30 am	4	7%	2 RV's
Hwy 41 From Wawona		Fri 11:40 am	3	5%	1 RV, Grove Rd. Closed
Store, RV and Overflow		Fri 12:35 pm	5	8%	2 RV's
Parking		Fri 1:33 pm	9	15%	3 RV's
		Fri 2:45 pm	6	10%	3 RV's, Grove Rd. Closed
(customer, grove		Fri 3:45 pm	5	8%	2 RV's
visitor, history center		Fri 4:35 pm	2	3%	1 RV
visitor)					
Avg. Occupancy			5	8%	

Yosemite National Park – Parking Occupancy Summary

Wawona and Mariposa Grove

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Wawona and Mariposa Grove All	406	Fri 10:30 am	247	61%	
		Fri 11:40 am	298	73%	Grove Rd. Closed
		Fri 12:35 pm	301	74%	
		[illegible]	[illegible]	[illegible]	
		Fri 2:45 pm	291	72%	Grove Rd. Closed
		Fri 3:45 pm	283	70%	
		Fri 4:35 pm	250	62%	
Avg. Occupancy			180	44%	

XX% = Peak Use Period

Source: BRW Field Survey, August 28, 1992

Yosemite National Park – Parking Occupancy Summary

Tuolumne Meadows Developed Area

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Tuolumne Meadows	25	Sat 10:00 am	17	68%	Partly Sunny
Visitor Center		Sat 11:00 am	27	108%	" "
		Sat 12:00 pm	22	88%	" "
(gen. visitor)		Sat 2:00 pm	25	100%	" "
		Sat 3:00 pm	16	64%	" "
Avg. Occupancy			21	86%	
Tuolumne Meadows	41	Sat 10:00 am	37	90%	Partly Sunny
Store and Grill		Sat 11:00 am	37	90%	" "
		Sat 12:00 pm	38	93%	" "
(gen. visitor)		Sat 2:00 pm	39	95%	" "
		Sat 3:00 pm	38	93%	" "
Avg. Occupancy			38	92%	
Tuolumne Meadows	20	Sat 10:00 am	13	65%	Partly Sunny
Gas Station and		Sat 11:00 am	19	95%	" "
Climbing Shop		Sat 12:00 pm	15	75%	" "
		Sat 2:00 pm	26	130%	" "
(gen. visitor, climber)		Sat 3:00 pm	18	90%	" "
Avg. Occupancy			18	91%	
Lembert Dome	25	Sat 10:00 am	24	96%	Partly Sunny, Only Hndcp Empty
		Sat 11:00 am	24	96%	" " "
(trailhead, climber)		Sat 12:00 pm	24	96%	" " "
		Sat 2:00 pm	24	96%	" " "
		Sat 3:00 pm	15	60%	" "
Avg. Occupancy			22	89%	
Lembert Dome	Informal	Sat 10:00 am	33	NA	Partly Sunny
Overflow Strip Parking		Sat 11:00 am	55	NA	" "
		Sat 12:00 pm	49	NA	" "
(trailhead, climber)		Sat 2:00 pm	47	NA	" "
		Sat 3:00 pm	36	NA	" "
Avg. Occupancy			44	NA	
Soda Springs	10	Sat 10:00 am	10	100%	Partly Sunny
Trailhead		Sat 11:00 am	10	100%	" "
		Sat 12:00 pm	10	100%	" "
(trailhead, climber)		Sat 2:00 pm	10	100%	" "
		Sat 3:00 pm	10	100%	" "
Avg. Occupancy			10	100%	

Yosemite National Park – Parking Occupancy Summary

Tuolumne Meadows Developed Area

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Soda Springs	Informal	Sat 10:00 am	17	NA	Partly Sunny
Trailhead Strip		Sat 11:00 am	18	NA	" "
Parking		Sat 12:00 pm	16	NA	" "
		Sat 2:00 pm	19	NA	" "
(trailhead, climber)		Sat 3:00 pm	16	NA	" "
Avg. Occupancy			17	NA	
Tuolumne Meadows	65	Sat 10:00 am	38	58%	Partly Sunny
Stable		Sat 11:00 am	41	63%	" "
		Sat 12:00 pm	44	68%	" "
(stable visitor)		Sat 2:00 pm	40	62%	" "
		Sat 3:00 pm	37	57%	" "
Avg. Occupancy			40	62%	
Wilderness Permit	62	Sat 10:00 am	58	94%	Partly Sunny
Parking Lot		Sat 11:00 am	62	100%	" ", Overflow Pkng
		Sat 12:00 pm	66	106%	" ", Overflow Pkng
(backpacker)		Sat 2:00 pm	57	92%	" "
		Sat 3:00 pm	53	85%	" "
Avg. Occupancy			59	95%	
Dog Lake	81	Sat 10:00 am	80	99%	Partly Sunny
Parking Lot		Sat 11:00 am	84	104%	" ", Overflow Pkng
		Sat 12:00 pm	83	102%	" ", Overflow Pkng
(trailhead, backpacker)		Sat 2:00 pm	79	98%	" "
		Sat 3:00 pm	79	98%	" "
Avg. Occupancy			81	100%	
Tuolumne Lodge	103	Sat 10:00 am	64	62%	Partly Sunny
Parking Lot		Sat 11:00 am	68	66%	" "
		Sat 12:00 pm	73	71%	" "
(lodge guest)		Sat 2:00 pm	82	80%	" "
		Sat 3:00 pm	89	86%	" "
Avg. Occupancy			75	73%	

Yosemite National Park – Parking Occupancy Summary

Tuolumne Meadows Developed Area

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Tuolumne Meadows Development All	432	Sat 10:00 am	341	79%	Partly Sunny
		Sat 11:00 am	372	86%	" "
		Sat 12:00 pm	375	87%	" "
		Sat 2:00 pm	**382**	**88%**	" "
		Sat 3:00 pm	355	82%	" "
Avg. Occupancy			365	84%	
Tuolumne Meadows Development All – Overflow Informal	Informal	Sat 10:00 am	50	NA	Partly Sunny
		Sat 11:00 am	**73**	**NA**	" "
		Sat 12:00 pm	65	NA	" "
		Sat 2:00 pm	66	NA	" "
		Sat 3:00 pm	52	NA	" "
Avg. Occupancy			61	NA	

XXX = Peak Use Period

Source: BHW Field Survey, August 29, 1992

Yosemite National Park – Parking Occupancy Summary

Tioga Road and Tuolumne Meadows

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Tuolumne Meadows	Informal	Sat 10:00 am	5	NA	Partly Sunny
Strip Parking – Gas		Sat 11:00 am	8	NA	" "
Station to Cathedral		Sat 12:00 pm	9	NA	" "
Lakes Strip Parking		**Sat 2:00 pm**	**14**	**NA**	" "
(gen. visitor, sight		Sat 3:00 pm	10	NA	" "
seeing)					
Avg. Occupancy			9	NA	
Cathedral Lakes	19	**Sat 11:00 am**	**19**	**100%**	Partly Sunny
Trailhead		Sat 12:00 pm	17	89%	" "
		Sat 2:00 pm	**19**	**100%**	" "
(trailhead, backpacker,		Sat 3:00 pm	18	95%	" "
climber)					" "
Avg. Occupancy			18	96%	
Cathedral Lakes	Informal	**Sat 11:00 am**	**26**	**NA**	Partly Sunny
Trailhead Strip Pkng		Sat 12:00 pm	24	NA	" "
		Sat 2:00 pm	24	NA	" "
(trailhead, backpacker,		Sat 3:00 pm	22	NA	" "
climber)					" "
Avg. Occupancy			24	NA	
Pothole Shuttle	Informal	Sat 11:00 am	18	NA	Partly Sunny
Stop	(2 Tmouts)	**Sat 12:00 pm**	**21**	**NA**	" "
		Sat 2:00 pm	19	NA	" "
(gen. visitor)		Sat 3:00 pm	17	NA	" "
					" "
Avg. Occupancy			19	NA	
Glen Aulin	Informal	Sat 11:00 am	5	NA	Partly Sunny
Trail Access	(2 Groups)	Sat 12:00 pm	6	NA	" "
		Sat 2:00 pm	6	NA	" "
(employee, backpacker,		**Sat 3:00 pm**	**7**	**NA**	" "
climber, trailhead)					" "
Avg. Occupancy			6	NA	
East Cottage	Informal	Sat 11:00 am	3	NA	Partly Sunny
Dome Access		Sat 12:00 pm	4	NA	" "
		Sat 2:00 pm	**7**	**NA**	" "
		Sat 3:00 pm	6	NA	" "
					" "
Avg. Occupancy			5	NA	
Fairview Dome	Informal	Sat 11:00 am	9	NA	Partly Sunny
Access		Sat 12:00 pm	9	NA	" "
		Sat 2:00 pm	**12**	**NA**	" "
(trailhead, climber)		Sat 3:00 pm	8	NA	" "
					" "
Avg. Occupancy			10	NA	

Yosemite National Park – Parking Occupancy Summary

Tioga Road and Tuolumne Meadows

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Daff Dome Access	**Informal**	Sat 11:00 am	3	NA	Partly Sunny
		Sat 12:00 pm	5	NA	" "
(trailhead, climber)		**Sat 2:00 pm**	**7**	**NA**	" "
		Sat 3:00 pm	**7**	**NA**	" "
					" "
Avg. Occupancy			6	NA	
Hammer Dome Access	**Informal (2 Groups)**	Sat 11:00 am	7	NA	Partly Sunny
		Sat 12:00 pm	**11**	**NA**	" "
		Sat 2:00 pm	**11**	**NA**	" "
(trailhead, climber)		Sat 3:00 pm	5	NA	" "
					" "
Avg. Occupancy			9	NA	
Lamb Dome Access	**Informal**	**Sat 11:00 am**	**1**	**NA**	Partly Sunny
		Sat 12:00 pm	**1**	**NA**	" "
		Sat 2:00 pm	0	NA	" "
(trailhead, climber)		Sat 3:00 pm	0	NA	" "
					" "
Avg. Occupancy			1	NA	
Lamb/Mariuolumne Dome Access	**Informal**	Sat 11:00 am	5	NA	Partly Sunny
		Sat 12:00 pm	**6**	**NA**	" "
		Sat 2:00 pm	4	NA	" "
(trailhead, climber)		Sat 3:00 pm	1	NA	" "
					" "
Avg. Occupancy			5	NA	
Whiz Dome Access	**Informal (Turnout)**	Sat 11:00 am	0	NA	Partly Sunny
		Sat 12:00 pm	**1**	**NA**	" "
		Sat 2:00 pm	0	NA	" "
(trailhead, climber)		**Sat 3:00 pm**	**1**	**NA**	" "
					" "
Avg. Occupancy			1	NA	
Medlicott Dome Access	**Informal**	Sat 11:00 am	0	NA	Partly Sunny
		Sat 12:00 pm	0	NA	" "
		Sat 2:00 pm	0	NA	" "
(trailhead, climber)		**Sat 3:00 pm**	**1**	**NA**	" "
					" "
Avg. Occupancy			0	NA	
Fishermans Trail/ Main Medlicott Dome Access	**Informal (Turnout)**	Sat 11:00 am	2	NA	Partly Sunny
		Sat 12:00 pm	3	NA	" "
		Sat 2:00 pm	3	NA	" "
(trailhead, climber)		**Sat 3:00 pm**	**5**	**NA**	" "
					" "
Avg. Occupancy			3	NA	

Yosemite National Park – Parking Occupancy Summary

Tioga Road and Tuolumne Meadows

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Low Profile	**Informal**	Sat 11:00 am	2	NA	Partly Sunny
Dome Access		Sat 12:00 pm	6	NA	• •
		Sat 2:00 pm	**9**	**NA**	• •
(trailhead, climber)		Sat 3:00 pm	7	NA	• •
					• •
Avg. Occupancy			6	NA	
Dosier Dome	**Informal**	Sat 11:00 am	0	NA	Partly Sunny
Access		Sat 12:00 pm	1	NA	• •
		Sat 2:00 pm	2	NA	• •
(trailhead, climber)		**Sat 3:00 pm**	**3**	**NA**	• •
					• •
Avg. Occupancy			2	NA	
Phobos Cliff/Pywiack	**Informal**	Sat 11:00 am	1	NA	Partly Sunny
Dome Access		Sat 12:00 pm	1	NA	• •
		Sat 2:00 pm	2	NA	• •
(trailhead, climber)		**Sat 3:00 pm**	**3**	**NA**	• •
					• •
Avg. Occupancy			2	NA	
Main Pywiack	**Informal**	**Sat 11:00 am**	**15**	**NA**	Partly Sunny
Dome Access		Sat 12:00 pm	11	NA	• •
		Sat 2:00 pm	11	NA	• •
(trailhead, climber)		Sat 3:00 pm	7	NA	• •
					• •
Avg. Occupancy			11	NA	
Tenaya Lake	70	Sat 11:00 am	10	14%	Partly Sunny
Picnic Area		Sat 12:00 pm	16	23%	• •
		Sat 2:00 pm	**21**	**30%**	• •
(picnic, trailhead, climber)		Sat 3:00 pm	5	7%	• •
					• •
Avg. Occupancy			13	19%	
Tenaya Lake Strip	**Informal**	Sat 11:00 am	6	NA	Partly Sunny
Parking Areas		Sat 12:00 pm	11	NA	• •
		Sat 2:00 pm	**20**	**NA**	• •
(picnic, trailhead, climber)		Sat 3:00 pm	7	NA	• •
					• •
Avg. Occupancy			11	NA	
Stately Pleasure/	**Informal**	**Sat 11:00 am**	**16**	**NA**	Partly Sunny
Poly Dome Access		**Sat 12:00 pm**	**15**	**NA**	• •
		Sat 2:00 pm	14	NA	• •
(trailhead, climber, spectator)		Sat 3:00 pm	4	NA	• •
					• •
Avg. Occupancy			12	NA	

Yosemite National Park – Parking Occupancy Summary

Tioga Road and Tuolumne Meadows

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Murphy Creek	25	Sat 11:00 am	23	92%	Partly Sunny
Trailhead		**Sat 12:00 pm**	**24**	**96%**	• •
		Sat 2:00 pm	**24**	**96%**	• •
(trailhead)		Sat 3:00 pm	19	76%	• •
					• •
Avg. Occupancy			**23**	**90%**	
Murphy Creek	**Informal**	Sat 11:00 am	2	NA	Partly Sunny
Trailhead Strip Pkng		Sat 12:00 pm	2	NA	• •
		Sat 2:00 pm	2	NA	• •
(trailhead)		**Sat 3:00 pm**	**3**	**NA**	• •
					• •
Avg. Occupancy			**2**	**NA**	
Tenaya Lake	**Informal**	Sat 11:00 am	12	NA	Partly Sunny
Turnouts		**Sat 12:00 pm**	**19**	**NA**	• •
		Sat 2:00 pm	12	NA	• •
(picnic, trailhead,		Sat 3:00 pm	12	NA	• •
climber)					• •
Avg. Occupancy			**14**	**NA**	
Sunrise Lakes	23	**Sat 11:00 am**	**23**	**100%**	Partly Sunny
Trailhead		Sat 12:00 pm	22	96%	• •
		Sat 2:00 pm	22	96%	• •
(trailhead)		Sat 3:00 pm	22	96%	• •
					• •
Avg. Occupancy			**22**	**97%**	
Sunrise Lakes	**Informal**	Sat 11:00 am	23	NA	Partly Sunny
Trailhead Strip Pkng		Sat 12:00 pm	24	NA	• •
		Sat 2:00 pm	**28**	**NA**	• •
(trailhead)		Sat 3:00 pm	21	NA	• •
					• •
Avg. Occupancy			**24**	**NA**	
Olmsted Point	65	Sat 11:00 am	19	29%	Partly Sunny
		Sat 12:00 pm	28	43%	• •
(view point, climber)		**Sat 2:00 pm**	**30**	**46%**	• •
		Sat 3:00 pm	18	28%	• •
					• •
Avg. Occupancy			**24**	**37%**	
Olmsted Canyon	**Informal**	Sat 11:00 am	0	NA	Partly Sunny
		Sat 12:00 pm	2	NA	• •
(climber)		**Sat 2:00 pm**	**3**	**NA**	• •
		Sat 3:00 pm	**3**	**NA**	• •
					• •
Avg. Occupancy			**2**	**NA**	

Yosemite National Park – Parking Occupancy Summary

Tioga Road and Tuolumne Meadows

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Tioga Road and Tuolumne Meadows All	Undefined	Sat 11:00 am	257	NA	Partly Sunny
		Sat 12:00 pm	301	NA	" "
		Sat 2:00 pm	[illegible]	NA	" "
		Sat 3:00 pm	242	NA	" "
					" "
Avg. Occupancy			281	NA	

▨ XXX = Peak Use Period

Source: BRW Field Survey, August 29, 1992

Note: A total of 202 spaces exist in designated parking areas (Cathedral Lakes Trailhead, Tenaya Lake Picnic Area, Murphy Creek Trailhead, Sunrise Lakes Trailhead, Olmsted point)

Yosemite National Park – Parking Occupancy Summary

Yosemite Village Amenities, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
General Store	179	Sun 10:00 am	179	100%	Clear Skies, 4 Hndcp Used
		Sun 11:00 am	179	100%	" ", 4 Hndcp Used
(gen. visitor)		Sun 11:30 am	177	99%	Overcast Skies, 2 Hndcp Used
		Sun 12:30 pm	178	99%	Rain, 3 Hndcp Used
		Sun 2:30 pm	179	100%	Overcast Skies, 4 Hndcp Used
		Sun 3:10 pm	179	100%	" ", 4 Hndcp Used
		Sun 4:00 pm	155	87%	" "
		Sun 5:00 pm	123	69%	" "
		Sun 5:45 pm	98	55%	" "
Avg. Occupancy			161	90%	
Degnan's Store and Cafeteria	16	Sun 10:00 am	16	100%	Clear Skies
		Sun 11:00 am	16	100%	" "
		Sun 11:30 am	16	100%	Overcast Skies
(gen. visitor)		Sun 12:30 pm	16	100%	Rain
		Sun 2:30 pm	16	100%	Overcast Skies
		Sun 3:10 pm	16	100%	" "
		Sun 4:00 pm	16	100%	" "
		Sun 5:00 pm	15	94%	" "
		Sun 5:45 pm	16	100%	" "
Avg. Occupancy			16	99%	
Visitor Center	71	Sun 10:00 am	71	100%	Clear Skies
		Sun 11:00 am	71	100%	" "
(gen. visitor)		Sun 11:30 am	71	100%	Overcast Skies
		Sun 12:30 pm	71	100%	Rain
		Sun 2:30 pm	71	100%	Overcast Skies
		Sun 3:10 pm	71	100%	" "
		Sun 4:00 pm	57	80%	" "
		Sun 5:00 pm	61	86%	" "
		Sun 5:45 pm	51	72%	" "
Avg. Occupancy			66	93%	
Village All	266	Sun 10:00 am	266	100%	Clear Skies
		Sun 11:00 am	266	100%	" "
(gen. visitor)		Sun 11:30 am	264	99%	Overcast Skies
		Sun 12:30 pm	265	100%	Rain
		Sun 2:30 pm	266	100%	Overcast Skies
		Sun 3:10 pm	266	100%	" "
		Sun 4:00 pm	228	86%	" "
		Sun 5:00 pm	199	75%	" "
		Sun 5:45 pm	165	62%	" "
Avg. Occupancy			243	91%	

XXX = Peak Use Period

Source: BRW Field Survey August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Curry Village\Camp Curry, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Curry #1	2	Sun 10:00 am	0	0%	Clear Skies
		Sun 11:20 am	1	50%	" "
(village guest,		Sun 12:30 pm	0	0%	Rain
village visitor)		Sun 1:40 pm	1	50%	Overcast Skies
		Sun 2:50 pm	1	50%	" "
		Sun 4:05 pm	1	50%	" "
		Sun 5:15 pm	0	0%	" "
		Sun 6:10 pm	0	0%	" "
Avg. Occupancy			1	25%	
Curry #2	30	Sun 10:00 am	6	20%	Clear Skies
		Sun 11:20 am	5	17%	" "
(village guest,		Sun 12:30 pm	5	17%	Rain
village visitor)		Sun 1:40 pm	7	23%	Overcast Skies
		Sun 2:50 pm	7	23%	" "
		Sun 4:05 pm	8	27%	" "
		Sun 5:15 pm	5	17%	" "
		Sun 6:10 pm	6	20%	" "
Avg. Occupancy			6	20%	
Curry #3	150	Sun 10:00 am	75	50%	Clear Skies
		Sun 11:20 am	49	33%	" "
(village guest,		Sun 12:30 pm	41	27%	Rain
village visitor)		Sun 1:40 pm	42	28%	Overcast Skies
		Sun 2:50 pm	48	32%	" "
		Sun 4:05 pm	67	45%	" "
		Sun 5:15 pm	80	53%	" "
		Sun 6:10 pm	83	55%	" "
Avg. Occupancy			61	40%	
Curry #4	33	Sun 10:00 am	24	73%	Clear Skies
		Sun 11:20 am	23	70%	" "
(village guest,		Sun 12:30 pm	23	70%	Rain
village visitor)		Sun 1:40 pm	22	67%	Overcast Skies
		Sun 2:50 pm	33	100%	" "
		Sun 4:05 pm	28	85%	" "
		Sun 5:15 pm	29	88%	" "
		Sun 6:10 pm	33	100%	" "
Avg. Occupancy			27	81%	

Yosemite National Park – Parking Occupancy Summary

Curry Village\Camp Curry, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Curry #5	47	Sun 10:00 am	6	13%	Clear Skies
		Sun 11:20 am	**18**	**38%**	" "
(village guest, village visitor)		Sun 12:30 pm	10	21%	Rain
		Sun 1:40 pm	12	26%	Overcast Skies
		Sun 2:50 pm	9	19%	" "
		Sun 4:05 pm	6	13%	" "
		Sun 5:15 pm	6	13%	" "
		Sun 6:10 pm	8	17%	" "
Avg. Occupancy			9	20%	
Curry #6	195	Sun 10:00 am	188	96%	Clear Skies, 3 Hndcp Used
		Sun 11:20 am	**189**	**97%**	" ", 3 Hndcp Used
(village guest, village visitor)		Sun 12:30 pm	180	92%	Rain, 4 Hndcp Used
		Sun 1:40 pm	160	82%	Overcast Skies, 2 Hndcp Used
		Sun 2:50 pm	148	76%	" ", 2 Hndcp Used
		Sun 4:05 pm	161	83%	" ", 3 Hndcp Used
		Sun 5:15 pm	155	79%	" ", 3 Hndcp Used
		Sun 6:10 pm	159	82%	" ", 2 Hndcp Used
Avg. Occupancy			168	86%	
Curry All	457	**Sun 10:00 am**	**299**	**65%**	Clear Skies
		Sun 11:20 am	285	62%	" "
(village guest, village visitor)		Sun 12:30 pm	259	57%	Rain
		Sun 1:40 pm	244	53%	Overcast Skies
		Sun 2:50 pm	246	54%	" "
		Sun 4:05 pm	271	59%	" "
		Sun 5:15 pm	275	60%	" "
		Sun 6:10 pm	289	63%	" "
Avg. Occupancy			271	59%	

XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Yosemite Lodge, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Yosemite Lodge #1	70	Sun 10:00 am	65	93%	Clear Skies
		Sun 11:00 am	58	83%	" "
(gen. visitor,		Sun 11:30 am	51	73%	Overcast Skies
lodge guest)		Sun 12:30 pm	59	84%	Rain
		Sun 2:30 pm	66	94%	Overcast Skies
		Sun 3:10 pm	60	86%	" "
		Sun 4:00 pm	64	91%	" "
		Sun 5:00 pm	62	89%	" "
		Sun 5:45 pm	68	97%	" "
Avg. Occupancy			61	88%	
Yosemite Lodge #2	38	Sun 10:00 am	29	76%	Clear Skies
		Sun 11:00 am	32	84%	" "
(gen. visitor,		Sun 11:30 am	28	74%	Overcast Skies
lodge guest)		Sun 12:30 pm	26	68%	Rain
		Sun 2:30 pm	27	71%	Overcast Skies
		Sun 3:10 pm	20	53%	" "
		Sun 4:00 pm	38	100%	" "
		Sun 5:00 pm	36	95%	" "
		Sun 5:45 pm	37	97%	" "
Avg. Occupancy			30	80%	
Yosemite Lodge #3	59	Sun 10:00 am	30	51%	Clear Skies
		Sun 11:00 am	29	49%	" "
(gen. visitor,		Sun 11:30 am	25	42%	Overcast Skies
lodge guest)		Sun 12:30 pm	26	44%	Rain
		Sun 2:30 pm	15	25%	Overcast Skies
		Sun 3:10 pm	18	31%	" "
		Sun 4:00 pm	20	34%	" "
		Sun 5:00 pm	21	36%	" "
		Sun 5:45 pm	27	46%	" "
Avg. Occupancy			23	40%	
Yosemite Lodge #4	29	Sun 10:00 am	26	90%	Clear Skies, Hndcp Space Used
		Sun 11:00 am	25	86%	" "
(gen. visitor,		Sun 11:30 am	25	86%	Overcast Skies
lodge guest)		Sun 12:30 pm	22	76%	Rain
		Sun 2:30 pm	25	86%	Overcast Skies
		Sun 3:10 pm	27	93%	" "
		Sun 4:00 pm	28	97%	" "
		Sun 5:00 pm	29	100%	" ", Hndcp Space Used
		Sun 5:45 pm	29	100%	" ", Hndcp Space Used
Avg. Occupancy			26	90%	

Yosemite National Park – Parking Occupancy Summary

Yosemite Lodge, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Yosemite Lodge #5	72	Sun 10:00 am	72	100%	Clear Skies, Hndcp Space Used
		Sun 11:00 am	70	97%	" "
(gen. visitor,		Sun 11:30 am	68	94%	Overcast Skies
lodge guest)		Sun 12:30 pm	68	94%	Rain, Hndcp Space Used
		Sun 2:30 pm	71	99%	Overcast Skies
		Sun 3:10 pm	70	97%	" "
		Sun 4:00 pm	69	96%	" "
		Sun 5:00 pm	72	100%	" ", Hndcp Space Used
		Sun 5:45 pm	70	97%	" "
Avg. Occupancy			70	97%	
Yosemite Lodge #6	103	Sun 10:00 am	91	88%	Clear Skies
	(1 bus)	Sun 11:00 am	70	68%	" "
(gen. visitor,		Sun 11:30 am	71	69%	Overcast Skies
lodge guest)		Sun 12:30 pm	67	65%	Rain
		Sun 2:30 pm	86	83%	Overcast Skies
		Sun 3:10 pm	78	76%	" "
		Sun 4:00 pm	79	77%	" "
		Sun 5:00 pm	91	88%	" "
		Sun 5:45 pm	97	94%	" "
Avg. Occupancy			81	79%	
Yosemite Lodge #7	115	Sun 10:00 am	85	74%	Clear Skies
		Sun 11:00 am	70	61%	" "
(gen. visitor,		Sun 11:30 am	55	48%	Overcast Skies
lodge guest)		Sun 12:30 pm	56	49%	Rain
		Sun 2:30 pm	71	62%	Overcast Skies
		Sun 3:10 pm	84	73%	" "
		Sun 4:00 pm	86	75%	" "
		Sun 5:00 pm	96	83%	" "
		Sun 5:45 pm	104	90%	" "
Avg. Occupancy			79	68%	
Yosemite Lodge All	486	Sun 10:00 am	398	82%	Clear Skies
		Sun 11:00 am	354	73%	" "
(gen. visitor,		Sun 11:30 am	323	66%	Overcast Skies
lodge guest)		Sun 12:30 pm	324	67%	Rain
		Sun 2:30 pm	361	74%	Overcast Skies
		Sun 3:10 pm	357	73%	" "
		Sun 4:00 pm	384	79%	" "
		Sun 5:00 pm	407	84%	" "
		Sun 5:45 pm	432	89%	" "
Avg. Occupancy			371	76%	

▨ XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Ahwahnee Hotel, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Ahwahnee #1	55	Sun 10:00 am	55	100%	Clear Skies
		Sun 11:20 am	55	100%	" "
(hotel guest,		**Sun 12:30 pm**	**58**	**105%**	Rain, Illegal Pkng
hotel visitor)		Sun 1:40 pm	57	104%	Overcast Skies, Illegal Pkng
		Sun 2:50 pm	55	100%	" "
		Sun 4:05 pm	56	102%	" ", Illegal Pkng
		Sun 5:15 pm	54	98%	" "
		Sun 6:10 pm	57	104%	" ", Illegal Pkng
Avg. Occupancy			56	102%	
Ahwahnee #2	87	Sun 10:00 am	85	98%	Clear Skies
		Sun 11:20 am	**87**	**100%**	" "
(hotel guest,		Sun 12:30 pm	85	98%	Rain
hotel visitor)		Sun 1:40 pm	76	87%	Overcast Skies
		Sun 2:50 pm	68	78%	" "
		Sun 4:05 pm	54	62%	" "
		Sun 5:15 pm	52	60%	" "
		Sun 6:10 pm	65	75%	" "
Avg. Occupancy			72	82%	
Ahwahnee All	142	Sun 10:00 am	140	99%	Clear Skies
		Sun 11:20 am	142	100%	" "
(hotel guest,		**Sun 12:30 pm**	**143**	**101%**	Rain
hotel visitor)		Sun 1:40 pm	133	94%	Overcast Skies
		Sun 2:50 pm	123	87%	" "
		Sun 4:05 pm	110	77%	" "
		Sun 5:15 pm	106	75%	" "
		Sun 6:10 pm	122	86%	" "
Avg. Occupancy			127	90%	

XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Sunnyside Campground, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Sunnyside Camp-ground (walk-in-camping, climbing)	84	Sun 10:00 am	67	80%	Clear Skies
		Sun 11:20 am	59	70%	" "
		Sun 12:30 pm	56	67%	Rain
		Sun 1:40 pm	47	56%	Overcast Skies
		Sun 2:50 pm	47	56%	" "
		Sun 4:05 pm	48	57%	" "
		Sun 5:15 pm	51	61%	" "
		Sun 6:10 pm	46	55%	" "
Avg. Occupancy			53	63%	

▨ XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

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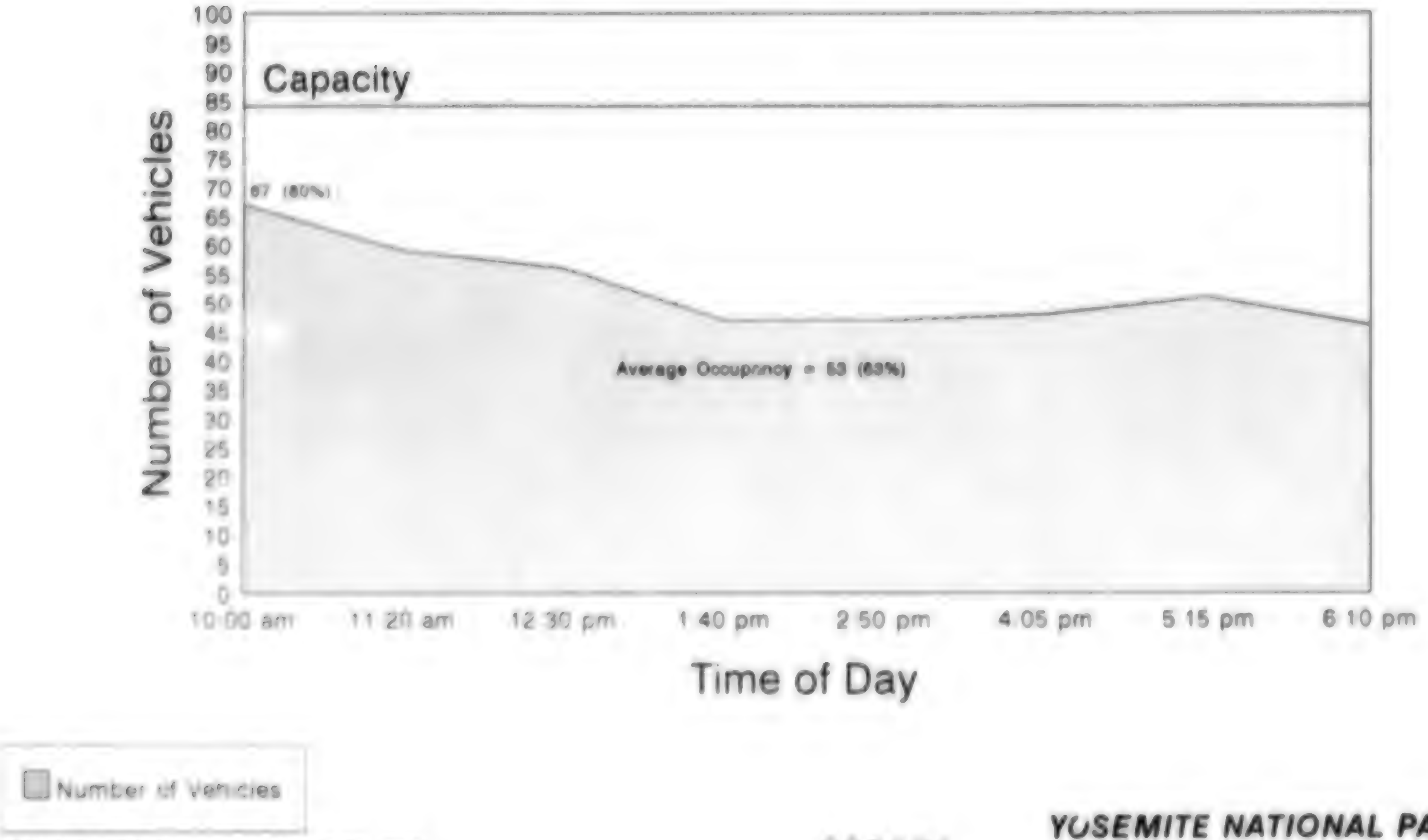
SUNNYSIDE CAMPGROUND
Parking Occupancy Summary



SOURCE: BRW field survey, August 30, 1990.

Yosemite National Park – Parking Occupancy Summary

Formal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Curry Orchard, Primary Day-Use Parking Area	420	Sun 10:00 am	321	76%	Clear Skies
		Sun 11:20 am	330	79%	" "
		Sun 12:30 pm	**333**	**79%**	Rain
(gen. visitor)		Sun 1:40 pm	240	57%	Overcast Skies
		Sun 2:50 pm	170	40%	" "
		Sun 4:05 pm	142	34%	" "
		Sun 5:15 pm	116	28%	" "
		Sun 6:10 pm	107	25%	" "
Avg. Occupancy			220	52%	
Yosemite Falls	93	Sun 10:00 am	34	37%	Clear Skies, 3 Buses
	(12 bus)	Sun 11:20 am	55	59%	" ", 4 Buses
(gen. visitor,view,		Sun 12:30 pm	57	61%	Rain, 8 Buses
rest stop, traihead)		**Sun 1:40 pm**	**61**	**66%**	Overcast Skies, 6 Buses
		Sun 2:50 pm	59	63%	" ", 6 Buses
		Sun 4:05 pm	44	47%	" ", 1 Bus
		Sun 5:15 pm	48	52%	" ", 1 Bus
		Sun 6:10 pm	38	41%	" ", 2 Buses
Avg. Occupancy			50	53%	
Lower Brother Pullout	10	Sun 10:00 am	0	0%	Clear Skies
		Sun 11:20 am	1	10%	" "
(gen. visitor,view,		Sun 12:30 pm	5	50%	Rain
rest stop)		Sun 1:40 pm	1	10%	Overcast Skies
		Sun 2:50 pm	2	20%	" "
		Sun 4:05 pm	**3**	**30%**	" "
		Sun 5:15 pm	2	20%	" "
		Sun 6:10 pm	1	10%	" "
Avg. Occupancy			2	19%	
Rocky Point Pullout 1	15	**Sun 10:00 am**	**6**	**40%**	Clear Skies
		Sun 11:20 am	2	13%	" "
(gen. visitor,view,		Sun 12:30 pm	0	0%	Rain
rest stop, river		Sun 1:40 pm	2	13%	Overcast Skies
access)		Sun 2:50 pm	1	7%	" "
		Sun 4:05 pm	0	0%	" "
		Sun 5:15 pm	2	13%	" "
		Sun 6:10 pm	0	0%	" "
Avg. Occupancy			2	11%	

Yosemite National Park – Parking Occupancy Summary

Formal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Rocky Point Pullout 2	3	Sun 10:00 am	0	0%	Clear Skies
		Sun 11:20 am	0	0%	" "
(gen. visitor,view,		Sun 12:30 pm	0	0%	Rain
rest stop, river		**Sun 1:40 pm**	**2**	**67%**	Overcast Skies
access)		Sun 2:50 pm	1	33%	" "
		Sun 4:05 pm	1	33%	" "
		Sun 5:15 pm	1	33%	" "
		Sun 6:10 pm	0	0%	" "
Avg. Occupancy			1	21%	
Rocky Point Pullout 3	6	Sun 10:00 am	0	0%	Clear Skies
		Sun 11:20 am	0	0%	" "
(gen. visitor,view,		Sun 12:30 pm	0	0%	Rain
rest stop, river		Sun 1:40 pm	0	0%	Overcast Skies
access)		Sun 2:50 pm	0	0%	" "
		Sun 4:05 pm	**8**	**133%**	" ", Coyote Spectators
		Sun 5:15 pm	1	17%	" "
		Sun 6:10 pm	0	0%	" "
Avg. Occupancy			1	19%	
El Capitan East 1	46	Sun 10:00 am	14	30%	Clear Skies
Parking Pullout Strips		Sun 11:20 am	18	39%	" "
		Sun 12:30 pm	**28**	**64%**	Rain, 1 Bus
(gen. visitor,view,		**Sun 1:40 pm**	**25**	**64%**	Overcast Skies
rest stop, climber)		Sun 2:50 pm	16	35%	" "
		Sun 4:05 pm	13	28%	" "
		Sun 5:15 pm	14	30%	" "
		Sun 6:10 pm	13	28%	" "
Avg. Occupancy			17	38%	
El Capitan East 2	10	**Sun 10:00 am**	**3**	**30%**	Clear Skies
Parking Pullout		Sun 11:20 am	1	10%	" "
		Sun 12:30 pm	0	0%	Rain
(gen. visitor,view,		Sun 1:40 pm	0	0%	Overcast Skies
rest stop, climber)		Sun 2:50 pm	1	10%	" "
		Sun 4:05 pm	1	10%	" "
		Sun 5:15 pm	1	10%	" "
		Sun 6:10 pm	1	10%	" "
Avg. Occupancy			1	10%	

Yosemite National Park – Parking Occupancy Summary

Formal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Hanging Valley	10	Sun 10:00 am	2	20%	Clear Skies, 1 Bus
Lookout Pullout		Sun 11:20 am	2	20%	" "
		Sun 12:30 pm	3	30%	Rain
(gen. visitor,view,		Sun 1:40 pm	1	10%	Overcast Skies
rest stop, river		Sun 2:50 pm	1	10%	" ", 1 Bus
access)		Sun 4:05 pm	0	0%	" "
		Sun 5:15 pm	3	30%	" "
		Sun 6:10 pm	1	10%	" "
Avg. Occupancy			2	16%	
Valley View	10	Sun 10:00 am	2	20%	Clear Skies, 1 Bus
Pullout Parking Lot		Sun 11:20 am	5	50%	" ", 1 Bus
		Sun 12:30 pm	3	30%	Rain
(gen. visitor,view,		Sun 1:40 pm	3	30%	Overcast Skies, 1 Bus
rest stop, river		Sun 2:50 pm	1	10%	Overcast Skies
access)		Sun 4:05 pm	3	30%	" ", 1 Bus
		Sun 5:15 pm	2	20%	" "
		Sun 6:10 pm	4	40%	" "
Avg. Occupancy			3	29%	
Fern Spring Pullout	5	Sun 10:00 am	0	0%	Clear Skies
		Sun 11:20 am	0	0%	" "
		Sun 12:30 pm	0	0%	Rain
(gen. visitor,view,		Sun 1:40 pm	0	0%	Overcast Skies
rest stop, river		Sun 2:50 pm	0	0%	" "
access)		Sun 4:05 pm	1	20%	" "
		Sun 5:15 pm	1	20%	" "
		Sun 6:10 pm	2	40%	" "
Avg. Occupancy			1	10%	
Roosevelt/Muir	10	Sun 10:00 am	5	50%	Clear Skies, 2 RV's
Campfire Interp-		Sun 11:20 am	1	10%	" "
retation		Sun 12:30 pm	2	20%	Rain
		Sun 1:40 pm	1	10%	Overcast Skies
(gen. visitor,view,		Sun 2:50 pm	6	60%	" "
rest stop, river		Sun 4:05 pm	2	20%	" "
access)		Sun 5:15 pm	3	30%	" ", 1 RV
		Sun 6:10 pm	0	0%	" "
Avg. Occupancy			3	25%	

Yosemite National Park – Parking Occupancy Summary

Formal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Bridalveil Fall	55	Sun 10:00 am	23	42%	Clear Skies
		Sun 11:20 am	33	60%	" "
(gen. visitor, view, rest stop)		Sun 12:30 pm	49	89%	Rain
		Sun 1:40 pm	19	35%	Overcast Skies
		Sun 2:50 pm	28	51%	" "
		Sun 4:05 pm	17	31%	" "
		Sun 5:15 pm	17	31%	" "
		Sun 6:10 pm	10	18%	" "
Avg. Occupancy			25	45%	
Four Mile Trailhead	20	Sun 10:00 am	11	55%	Clear Skies
		Sun 11:20 am	18	90%	" "
(trailhead, climber)		Sun 12:30 pm	20	100%	Rain
		Sun 1:40 pm	19	95%	1 Bus,Overcast Skies
		Sun 2:50 pm	19	95%	" "
		Sun 4:05 pm	10	50%	" "
		Sun 5:15 pm	9	45%	" "
		Sun 6:10 pm	4	20%	" "
Avg. Occupancy			14	69%	
Four Mile Picnic Area	22	Sun 10:00 am	20	91%	Clear Skies
		Sun 11:20 am	17	77%	1 Bus," "
		Sun 12:30 pm	15	68%	2 Buses,Rain
(picnic)		Sun 1:40 pm	12	55%	Overcast Skies
		Sun 2:50 pm	12	55%	" "
		Sun 4:05 pm	12	55%	" "
		Sun 5:15 pm	11	50%	" "
		Sun 6:10 pm	8	36%	" "
Avg. Occupancy			13	61%	
Yosemite Chapel	20	Sun 10:00 am	15	75%	Clear Skies
		Sun 11:20 am	14	70%	" "
(gen. visitor, river access, view, rest stop)		Sun 12:30 pm	10	50%	Rain
		Sun 1:40 pm	4	20%	Overcast Skies
		Sun 2:50 pm	5	25%	" "
		Sun 4:05 pm	0	0%	" "
		Sun 5:15 pm	4	20%	" "
		Sun 6:10 pm	1	5%	" "
Avg. Occupancy			7	33%	

Yosemite National Park – Parking Occupancy Summary

Formal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Sentinel Bridge	26	**Sun 10:00 am**	**13**	**50%**	Clear Skies
		Sun 11:20 am	5	19%	" "
(gen. visitor, river		Sun 12:30 pm	3	12%	Rain
access, view, rest		Sun 1:40 pm	3	12%	Overcast Skies
stop)		Sun 2:50 pm	4	15%	" "
		Sun 4:05 pm	2	8%	" ", 1 Bus
		Sun 5:15 pm	2	8%	Overcast Skies
		Sun 6:10 pm	1	4%	" ", 1 Bus
Avg. Occupancy			4	16%	
Sierra Club	6	Sun 10:00 am	4	67%	Clear Skies
Memorial		Sun 11:20 am	6	100%	" ", 1 Bus
		Sun 12:30 pm	5	83%	Rain
(gen. visitor, view		**Sun 1:40 pm**	**8**	**133%**	Overcast Skies
rest stop)		Sun 2:50 pm	2	33%	" "
		Sun 4:05 pm	3	50%	" "
		Sun 5:15 pm	3	50%	" "
		Sun 6:10 pm	1	17%	" "
Avg. Occupancy			4	67%	
Church Bowl	25	Sun 10:00 am	8	32%	Clear Skies
		Sun 11:20 am	**18**	**72%**	" "
(trailhead)		Sun 12:30 pm	10	40%	Rain
		Sun 1:40 pm	14	56%	Overcast Skies
		Sun 2:50 pm	11	44%	" "
		Sun 4:05 pm	5	20%	" "
		Sun 5:15 pm	6	24%	" "
		Sun 6:10 pm	4	16%	" "
Avg. Occupancy			10	38%	
Formal Day Use All	812	Sun 10:00 am	481	59%	Clear Skies
		Sun 11:20 am	526	65%	" "
		Sun 12:30 pm	**540**	**67%**	Rain
		Sun 1:40 pm	415	51%	Overcast Skies
		Sun 2:50 pm	339	42%	" "
		Sun 4:05 pm	267	33%	" "
		Sun 5:15 pm	246	30%	" "
		Sun 6:10 pm	196	24%	" "
Avg. Occupancy			376	46%	

▨ XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Informal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Camp 6, Rear Lot	Informal	Sun 10:00 am	2	NA	Clear Skies
		Sun 11:20 am	4	NA	" "
(gen. visitor)		Sun 12:30 pm	5	NA	Rain
		Sun 1:40 pm	3	NA	Overcast Skies
		Sun 2:50 pm	3	NA	" "
		Sun 4:05 pm	2	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			2	NA	
Camp 6, Access Strip Areas (2)	Informal	Sun 10:00 am	12	NA	Clear Skies
		Sun 11:20 am	12	NA	" "
		Sun 12:30 pm	31	NA	Rain
(gen. visitor, employees)		Sun 1:40 pm	27	NA	Overcast Skies
		Sun 2:50 pm	25	NA	" "
		Sun 4:05 pm	17	NA	" "
		Sun 5:15 pm	12	NA	" "
		Sun 6:10 pm	6	NA	" "
Avg. Occupancy			18	NA	
Turnouts – Rocky Point to El Capitan East Pkng Strips	Informal	Sun 10:00 am	0	NA	Clear Skies
		Sun 11:20 am	1	NA	" "
		Sun 12:30 pm	1	NA	Rain
		Sun 1:40 pm	0	NA	Overcast Skies
(gen. visitor, river access, view, rest stop, climber)		Sun 2:50 pm	0	NA	" "
		Sun 4:05 pm	0	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	1	NA	" "
Avg. Occupancy			0	NA	
El Capitan Meadow Strip Parking	Informal	Sun 10:00 am	7	NA	Clear Skies
		Sun 11:20 am	16	NA	" "
		Sun 12:30 pm	19	NA	Rain
(gen. visitor, river access, view, rest stop, climber)		Sun 1:40 pm	14	NA	Overcast Skies
		Sun 2:50 pm	8	NA	" "
		Sun 4:05 pm	18	NA	" "
		Sun 5:15 pm	15	NA	" "
		Sun 6:10 pm	14	NA	" "
Avg. Occupancy			14	NA	

Yosemite National Park – Parking Occupancy Summary

Informal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Turnouts – Hanging Valley Pullout to Valley View Pullout (gen. visitor, river access, view, rest stop)	Informal	Sun 10:00 am	1	NA	Clear Skies
		Sun 11:20 am	6	NA	" "
		Sun 12:30 pm	0	NA	Rain
		Sun 1:40 pm	0	NA	Overcast Skies
		Sun 2:50 pm	0	NA	" "
		Sun 4:05 pm	0	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	1	NA	" "
Avg. Occupancy			1	NA	
Turnouts – Roosevelt/Muir Interp to Hwy 41 (gen. visitor, river access, view, rest stop)	Informal	Sun 10:00 am	0	NA	Clear Skies
		Sun 11:20 am	0	NA	" "
		Sun 12:30 pm	3	NA	Rain
		Sun 1:40 pm	0	NA	Overcast Skies
		Sun 2:50 pm	1	NA	" "
		Sun 4:05 pm	1	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			1	NA	
Bridalveil Lookout Strip Parking (gen. visitor, view, rest stop)	Informal	Sun 10:00 am	7	NA	Clear Skies
		Sun 11:20 am	19	NA	2 Buses,"
		Sun 12:30 pm	20	NA	Rain
		Sun 1:40 pm	15	NA	Overcast Skies
		Sun 2:50 pm	8	NA	" "
		Sun 4:05 pm	9	NA	" "
		Sun 5:15 pm	6	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			11	NA	
River Turnouts – Bridalveil Strip to El Capitan Bridge (gen. visitor, river access, view, rest stop)	Informal	Sun 10:00 am	5	NA	Clear Skies
		Sun 11:20 am	7	NA	" "
		Sun 12:30 pm	10	NA	Rain
		Sun 1:40 pm	3	NA	Overcast Skies
		Sun 2:50 pm	3	NA	" "
		Sun 4:05 pm	1	NA	" "
		Sun 5:15 pm	1	NA	" "
		Sun 6:10 pm	1	NA	" "
Avg. Occupancy			4	NA	

Yosemite National Park – Parking Occupancy Summary

Informal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Turnouts – El Capitan Bridge to Four Mile Trailhead	Informal	Sun 10:00 am	1	NA	Clear Skies
		Sun 11:20 am	2	NA	" "
		Sun 12:30 pm	1	NA	Rain
		Sun 1:40 pm	3	NA	Overcast Skies
(gen. visitor, river access, view, rest stop)		Sun 2:50 pm	2	NA	" "
		Sun 4:05 pm	0	NA	" "
		Sun 5:15 pm	1	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			1	NA	
Long S[illegible] Parking – Four Mile Picnic Area to Yosemite Chapel	Informal	Sun 10:00 am	5	NA	Clear Skies
		Sun 11:20 am	3	NA	" "
		Sun 12:30 pm	0	NA	Rain
		Sun 1:40 pm	3	NA	Overcast Skies
(gen. visitor, river access, view, rest stop)		Sun 2:50 pm	1	NA	" "
		Sun 4:05 pm	0	NA	" "
		Sun 5:15 pm	4	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			2	NA	
River Turnouts – Sentinel Bridge to Sierra Club Memorial	Informal	Sun 10:00 am	0	NA	Clear Skies
		Sun 11:20 am	1	NA	" "
		Sun 12:30 pm	0	NA	Rain
		Sun 1:40 pm	0	NA	Overcast Skies
(gen. visitor, river access, view, rest stop)		Sun 2:50 pm	2	NA	" "
		Sun 4:05 pm	0	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	0	NA	" "
Avg. Occupancy			0	NA	
Meadow Strip and Turnout – Curry Village to Yosemite Village	Informal	Sun 10:00 am	3	NA	Clear Skies
		Sun 11:20 am	2	NA	" "
		Sun 12:30 pm	2	NA	Rain
		Sun 1:40 pm	4	NA	Overcast Skies
(gen. visitor, river access, view, rest stop)		Sun 2:50 pm	1	NA	" "
		Sun 4:05 pm	1	NA	" "
		Sun 5:15 pm	0	NA	" "
		Sun 6:10 pm	2	NA	" "
Avg. Occupancy			2	NA	

Yosemite National Park – Parking Occupancy Summary

Informal Day Use Parking Areas, Yosemite Valley

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Strip Parking – Yosemite Village to Sunnyside Cmpgrnd **(gen. visitor, view, rest stop, picnic, trailhead)**	**Informal**	Sun 10:00 am	5	NA	Clear Skies
		Sun 11:20 am	7	NA	" "
		Sun 12:30 pm	4	NA	Rain
		Sun 1:40 pm	7	NA	Overcast Skies
		Sun 2:50 pm	**11**	**NA**	" "
		Sun 4:05 pm	2	NA	" "
		Sun 5:15 pm	1	NA	" "
		Sun 6:10 pm	3	NA	" "
Avg. Occupancy			**5**	**NA**	
Informal Day Use All **(gen. visitor, view, rest stop, picnic, trailhead)**	**Informal**	Sun 10:00 am	48	NA	Clear Skies
		Sun 11:20 am	79	NA	" "
		Sun 12:30 pm	**96**	**NA**	Rain
		Sun 1:40 pm	79	NA	Overcast Skies
		Sun 2:50 pm	65	NA	" "
		Sun 4:05 pm	51	NA	" "
		Sun 5:15 pm	40	NA	" "
		Sun 6:10 pm	28	NA	" "
Avg. Occupancy			**61**	**NA**	

XXX = Peak Use Period

Source: BRW Field Survey, August 30, 1992

Yosemite National Park – Parking Occupancy Summary

Yosemite Valley to Big Oak Flat Entrance

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Big Oak Flat Entrance	21	Thu 10:20 am	16	76%	1 RV
Visitor Information		Thu 11:40 am	16	76%	1 RV
Center and Ranger Station		Thu 12:35 pm	17	81%	1 RV
(gen. visitor)		Thu 6:48 pm	6	29%	
Avg. Occupancy			14	65%	
Big Oak Flat Entrance	8	Thu 10:20 am	4	50%	1 RV
Strip Parking		Thu 11:40 am	3	38%	1 RV
		Thu 12:35 pm	3	38%	1 RV
(gen. visitor)		Thu 6:48 pm	0	0%	
Avg. Occupancy			3	31%	
Merced Grove	8	Thu 10:35 am	4	50%	
Pullout		Thu 11:45 am	2	25%	
		Thu 12:40 pm	5	63%	
(grove visitor)		Thu 6:54 pm	5	63%	
Avg. Occupancy			4	50%	
Crane Flat Service	21	Thu 10:45 am	12	57%	
Center		Thu 11:45 am	19	90%	
		Thu 12:45 pm	14	67%	
(gen. visitor)		Thu 6:20 pm	10	48%	
		Thu 7:02 pm	11	52%	
Avg. Occupancy			13	63%	
Tuolumne Grove	20	Thu 10:50 am	7	35%	1 Bus
Access, Upper Lot		Thu 11:50 am	2	10%	
		Thu 12:47 pm	3	15%	1 RV
(grove visitor)		Thu 6:22 pm	6	30%	1 Bus
		Thu 7:01 pm	5	25%	1 Bus
Avg. Occupancy			5	23%	
Tuolumne Grove	18	Thu 12:00 pm	16	89%	
Access, Lower Lot		Thu 12:20 pm	11	61%	
(grove visitor)		Thu 6:27 pm	7	39%	
Avg. Occupancy			11	63%	
Tuolumne Grove	Informal	Thu 12:00 pm	4	NA	
Access, Strip Parking		Thu 12:20 pm	2	NA	
(grove visitor)		Thu 6:27 pm	0	NA	
Avg. Occupancy			2	NA	

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Yosemite National Park – Parking Occupancy Summary

Yosemite Valley to Big Oak Flat Entrance

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Big Meadows	15	**Thu 6:15 pm**	**3**	**20%**	
Overlook, Foresta		Thu 7:00 pm	0	0%	
(view, rest area)					
Avg. Occupancy			2	10%	
Valley View Lookout –	10	**Thu 1:00 pm**	**10**	**100%**	
Btwn Foresta					
and W Tunnel					
(vie-, rest area)					
Avg. Occupancy			10	100%	
Valley View	12	**Thu 1:05 pm**	**8**	**67%**	
Turnouts – (2) Just		Thu 6:06 pm	4	33%	
East of W Tunnel		Thu 7:30 pm	0	0%	
(view, rest area)					
Avg. Occupancy			4	33%	
Cascade Creek	10	**Thu 1:06 pm**	**6**	**60%**	
Turnouts – (2)		Thu 6:07 pm	3	30%	
		Thu 7:31 pm	0	0%	
(trailhead, rest area)					
Avg. Occupancy			3	30%	
Hwy 140/Big Oak	13	Wed 2:35 pm	2	15%	
Flat Intersection		**Thu 6:00 pm**	**4**	**31%**	
N. Side 140		Thu 7:38 pm	2	15%	
(view, rest area)					
Avg. Occupancy			3	21%	
Hwy 140/Big Oak	5	**Wed 2:35 pm**	**1**	**20%**	
Flat Intersection		Thu 6:00 pm	0	0%	
S. Side 140		Thu 7:38 pm	0	0%	
(view, rest area)					
Avg. Occupancy			0	7%	

▨ XXX = Peak Use Period

Source: BRW Field Survey, August 26,27, 1992

Yosemite National Park – Parking Occupancy Summary

Yosemite Valley to Glacier Point

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Discovery View	34	Thu 2:30 pm	11	32%	2 RV's,1 Bus
Parking Lot North	(2 Bus)	Thu 5:25 pm	18	53%	1 Bus
		Thu 6:00 pm	11	32%	1 RV
(view point)		Thu 7:25 pm	7	21%	
Avg. Occupancy			12	35%	
Discovery View	24	Thu 2:30 pm	10	42%	
Parking Lot South		Thu 5:25 pm	5	21%	
		Thu 6:00 pm	4	17%	
(view point)		Thu 7:25 pm	0	0%	
Avg. Occupancy			5	20%	
Ostrander Lake	25	Thu 2:50 pm	15	60%	
Trailhead		Thu 7:00 pm	3	12%	
Avg. Occupancy			9	36%	
Mono Meadow	20	Thu 3:00 pm	10	50%	
Trailhead					
Avg. Occupancy			10	50%	
Sentinal Dome/	30	Thu 3:10 pm	23	77%	1 RV
Taft Point Trailheads		Thu 4:40 pm	17	57%	
		Thu 6:35 pm	11	37%	
(trailheads)		Thu 6:55 pm	9	30%	
Avg. Occupancy			15	50%	
Washburn Point	39	Thu 3:15 pm	15	38%	1 RV
Lookout		Thu 4:35 pm	16	41%	2 RV's
		Thu 6:40 pm	16	41%	
(view point)		Thu 6:50 pm	7	18%	
Avg. Occupancy			14	35%	
Glacier Point	199	Thu 3:20 pm	126	63%	7 RV's, 2 Buses
Lookout	(5 Bus)	Thu 4:30 pm	96	48%	3 RV's
(view point)		Thu 6:45 pm	105	53%	5 RV's
Avg. Occupancy			109	55%	

Yosemite National Park – Parking Occupancy Summary

Yosemite Valley to Glacier Point

Parking Lot (Use Type)	Total # Of Spaces	Sample Time	Total Spaces Occupied	Percentage Occupied	Comments
Glacier Point Lookout Bus Loading Zone (view point)	3	Thu 5:20 pm	3	100%	3 Buses
		Thu 4:30 pm	1	33%	1 Bus
		Thu 6:45 pm	0	0%	
Avg. Occupancy			1	44%	

XXX = Peak Use Period

Source: BRW Field Survey, August 27, 1992

Appendix 3: Yosemite Shuttle and Tour Passenger Data

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WAWONA SHUTTLE PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (8 Hrs.)
June 1991	16,635	555	2,029	69
June 1992	28,150	938	1,634	117
Diff. (1992–1991)	11,515	383	(395)	48
% Change	69%			
July 1991	32,858	1,060	1,786	133
July 1992	50,898	1,642	2,436	205
Diff. (1992–1991)	18,040	582	650	72
% Change	55%			
August 1991	47,631	1,536	2,787	192
August 1992	64,289	2,074	3,207	259
Diff. (1992–1991)	16,658	538	420	67
% Change	35%			
Total 3 Mo. 1991	97,124	1,056	2,787	132
Total 3 Mo. 1992	143,337	1,558	3,207	195
Diff. (1992–1991)	46,213	502	420	63
% Change	48%			

SOURCE: YP&CC

TUOLUMNE MEADOWS
SHUTTLE PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (12 Hrs.)
June 1991				
June 1992		(NOT OPERATIONAL)		
Diff. (1992–1991)				
% Change				
July 1991	–	–	–	–
July 1992	7,218	233	422	19
Diff. (1992–1991)				
% Change				
August 1991	–	–	–	–
August 1992	8,598	277	465	23
Diff. (1992–1991)				
% Change				
Total 2 Mo. 1991	–	–	–	–
Total 2 Mo. 1992	15,816	255	465	21
Diff. (1992–1991)				
% Change				

NOTE: Comparative data has not yet been aquired for 1991

SOURCE: YP&CC

TENAYA LAKE EXPRESS
SHUTTLE PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (8 Hrs.)
June 1991				
June 1992		(NOT OPERATIONAL)		
Diff. (1992–1991)				
% Change				
July 1991	–	–	–	–
July 1992	2,548	82	119	10
Diff. (1992–1991)				
% Change				
August 1991	–	–	–	–
August 1992	2,777	90	140	11
Diff. (1992–1991)				
% Change				
Total 2 Mo. 1991	–	–	–	–
Total 2 Mo. 1992	5,325	86	140	11
Diff. (1992–1991)				
% Change				

NOTE: Comparative data has not yet been aquired for 1991

SOURCE: YP&CC

YOSEMITE VALLEY
SHUTTLE PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (14.5 Hrs.)
June 1991	579,914	19,330	23,914	1,333
June 1992	–	–	–	–
Diff. (1992–1991)				
% Change				
July 1991	687,032	22,162	25,906	1,528
July 1992	–	–	–	–
Diff. (1992–1991)				
% Change				
August 1991	701,452	22,627	25,362	1,560
August 1992	–	–	–	–
Diff. (1992–1991)				
% Change				
Total 3 Mo. 1991	–	–	–	–
Total 3 Mo. 1992	1,968,398	21,396	25,906	1,476
Diff. (1992–1991)				
% Change				

NOTE: Comparative data has not yet been aquired for 1992.
Total Valley Shuttle Passengers carried from Jan. 1 to Oct. 25, 1992 = 3,162,224

SOURCE: YP&CC

MARIPOSA GROVE TOUR (Tram) PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (9 Hrs.)
June 1991	21,923	731	1,109	81
June 1992	24,083	803	1,020	89
Diff. (1992–1991)	2,160	72	(89)	8
% Change	10%			
July 1991	33,134	1,069	1,367	119
July 1992	32,065	1,034	1,371	115
Diff. (1992–1991)	(1,069)	(35)	4	(4)
% Change	–3%			
August 1991	35,738	1,153	1,469	128
August 1992	34,866	1,125	1,524	125
Diff. (1992–1991)	(872)	(28)	55	(3)
% Change	–2%			
Total 3 Mo. 1991	90,795	987	1,469	110
Total 3 Mo. 1992	91,014	989	1,524	110
Diff. (1992–1991)	219	2	55	0
% Change	0%			

SOURCE: YP&CC

YOSEMITE NATIONAL PARK
Shuttle Passenger Data

VALLEY TOUR (Tram) PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day	Average Pasengers Per Hour (Varies)
June 1991	15,620	521	723	
June 1992	14,602	487	684	
Diff. (1992–1991)	(1,018)	(34)	(39)	
% Change	–7%			
July 1991	18,679	603	934	
July 1992	17,643	569	694	
Diff. (1992–1991)	(1,036)	(34)	(240)	
% Change	–6%			
August 1991	23,227	749	1,116	
August 1992	22,152	715	1,067	
Diff. (1992–1991)	(1,075)	(34)	(49)	
% Change	–5%			
Total 3 Mo. 1991	57,526	625	1,116	
Total 3 Mo. 1992	54,397	591	1,067	
Diff. (1992–1991)	(3,129)	(34)	(49)	
% Change	–5%			

SOURCE: YP&CC

YOSEMITE NATIONAL PARK
Tour Passenger Data

GLACIER POINT
TOUR PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day
June 1991	3,828	128	226
June 1992	4,017	134	195
Diff. (1992–1991)	189	6	(31)
% Change	5%		
July 1991	3,921	126	186
July 1992	4,380	141	229
Diff. (1992–1991)	459	15	43
% Change	12%		
August 1991	4,594	148	292
August 1992	5,078	164	226
Diff. (1992–1991)	484	16	(66)
% Change	11%		
Total 3 Mo. 1991	12,343	134	292
Total 3 Mo. 1992	13,475	146	229
Diff. (1992–1991)	1,132	1	(63)
% Change	9%		

SOURCE: YP&CC

BIG TREES TOUR PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day
June 1991	248	8	30
June 1992	172	6	24
Diff. (1992–1991)	(76)	(3)	(6)
% Change	−31%		
July 1991	240	8	23
July 1992	215	7	20
Diff. (1992–1991)	(25)	(1)	(3)
% Change	−10%		
August 1991	386	12	47
August 1992	229	7	21
Diff. (1992–1991)	(157)	(5)	(26)
% Change	−41%		
Total 3 Mo. 1991	874	10	47
Total 3 Mo. 1992	616	7	24
Diff. (1992–1991)	(258)	1	(23)
% Change	−30%		

SOURCE: YP&CC

GRAND TOUR PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max Passengers Per Day
June 1991	1,119	37	121
June 1992	1,036	35	79
Diff. (1992–1991)	(83)	(3)	(42)
% Change	–7%		
July 1991	923	30	193
July 1992	1,063	34	78
Diff. (1992–1991)	140	5	(115)
% Change	15%		
August 1991	1,130	36	93
August 1992	1,090	35	84
Diff. (1992–1991)	(40)	(1)	(9)
% Change	–4%		
Total 3 Mo. 1991	3,172	34	193
Total 3 Mo. 1992	3,189	35	84
Diff. (1992–1991)	17	1	(109)
% Change	1%		

SOURCE: YP&CC

LEE VINING BUS PASSENGER DATA

	Actual Passengers Per Month	Average Passengers Per Day	Max. Passengers Per Day
June 1991			
June 1992	(NOT OPERATIONAL)		
Diff. (1992–1991)			
% Change			
July 1991	1,134	37	54
July 1992	1,057	34	55
Diff. (1992–1991)	(77)	(3)	1
% Change	–7%		
August 1991	1,127	36	59
August 1992	1,100	35	55
Diff. (1992–1991)	(27)	(1)	(4)
% Change	–2%		
Total 3 Mo. 1991	2,261	36	59
Total 3 Mo. 1992	2,157	35	55
Diff. (1992–1991)	(104)	(1)	(4)
% Change	–5%		

SOURCE: YP&CC

Appendix 4: Yosemite Additional Parking Duration Summaries

YOSEMITE NATIONAL PARK

Parking Turnover Rates

PARKING LOT	Sample Period Length (Hrs.)	LENGTH OF STAY 0–1 HOURS	1–2 HOURS	2–3 HOURS	3–4 HOURS	4–5 HOURS	5–6 HOURS	6–7 HOURS	7–8 HOURS	8–9 HOURS	TOTAL	TOTAL COUNT	AVERAGE
WAWONA/MARIPOSA GROVE													
MARIPOSA GROVE	8	50%	38%	9%	2%	1%	0%	0%	0%	0%	100%	297	1.16
WAWONA HOTEL	7	49%	14%	12%	5%	5%	2%	13%	0%		100%	104	2.12
WAWONA STORE	7	49%	22%	19%	7%	2%	1%	0%	0%		100%	124	1.43
TOTAL		50%	29%	12%	4%	2%	1%	3%	0%	0%	100%	525	1.41

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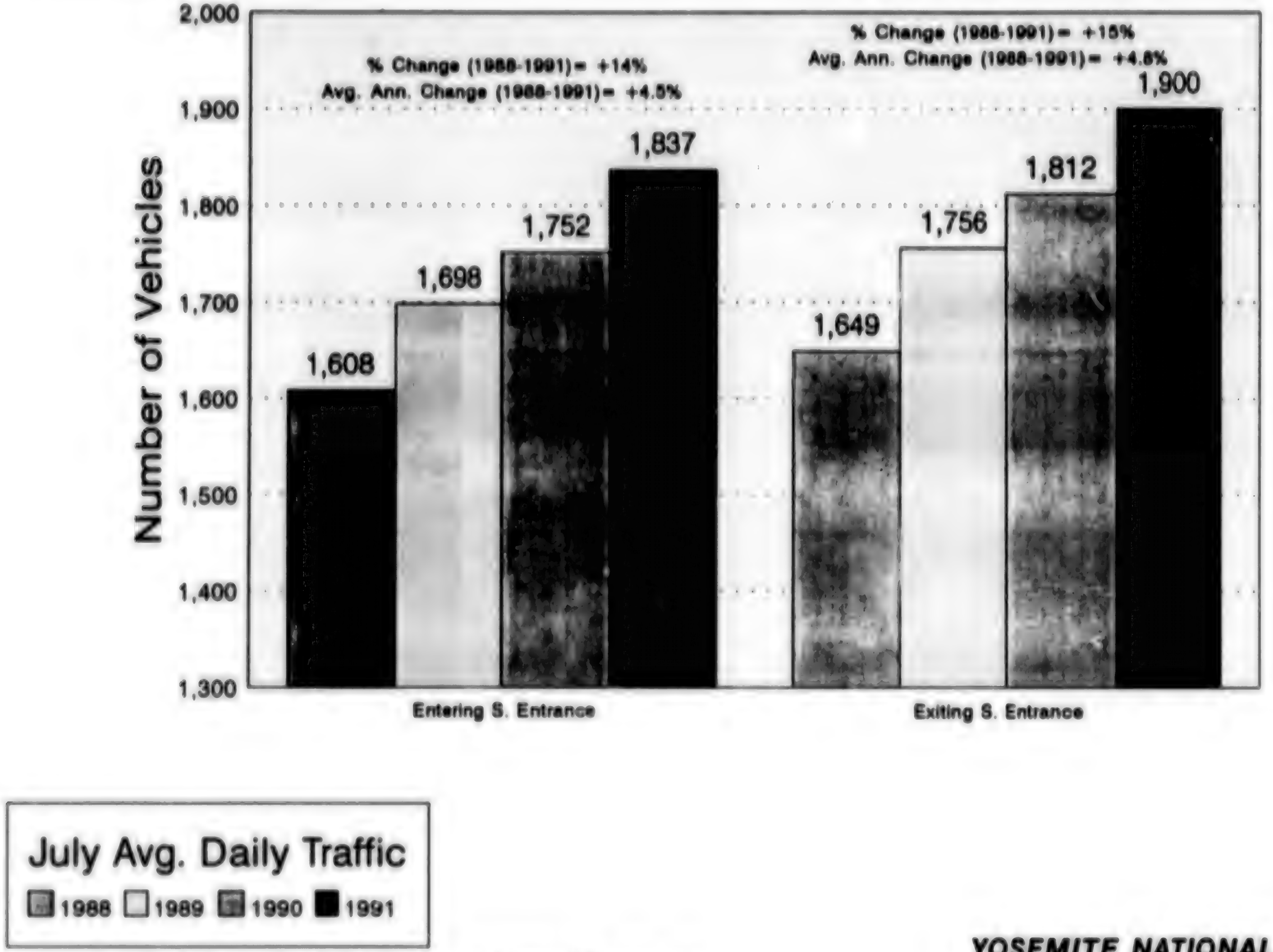
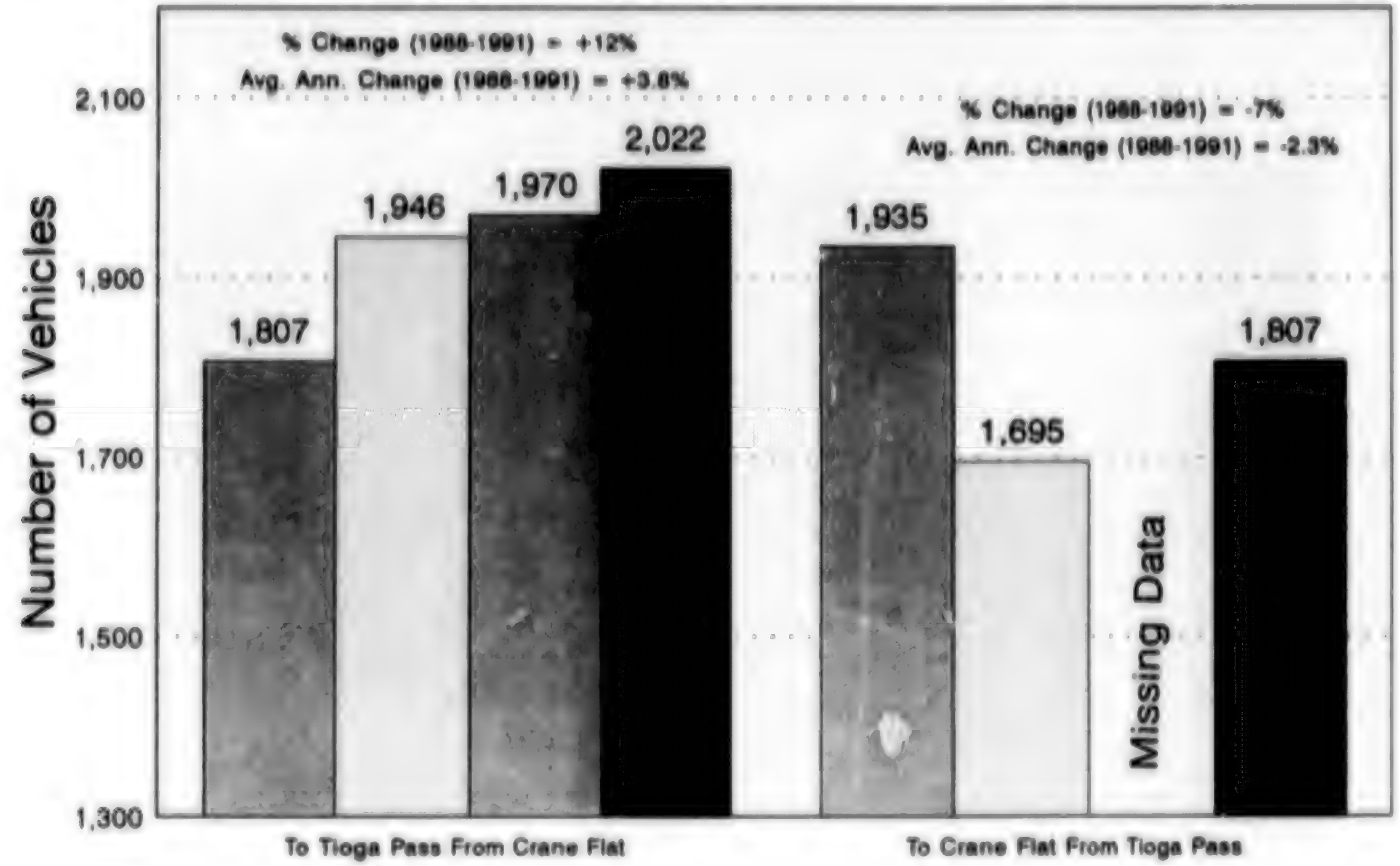
Appendix 5: Yosemite Additional Traffic Count Information

TRAFFIC COUNTS AT SOUTH ENTRANCE



SOURCE: National Park Service, Denver Service Center Branch of Transportation

TRAFFIC COUNTS ON TIOGA PASS ROAD, NORTH OF BIG OAK FLAT ROAD



July Avg. Daily Traffic

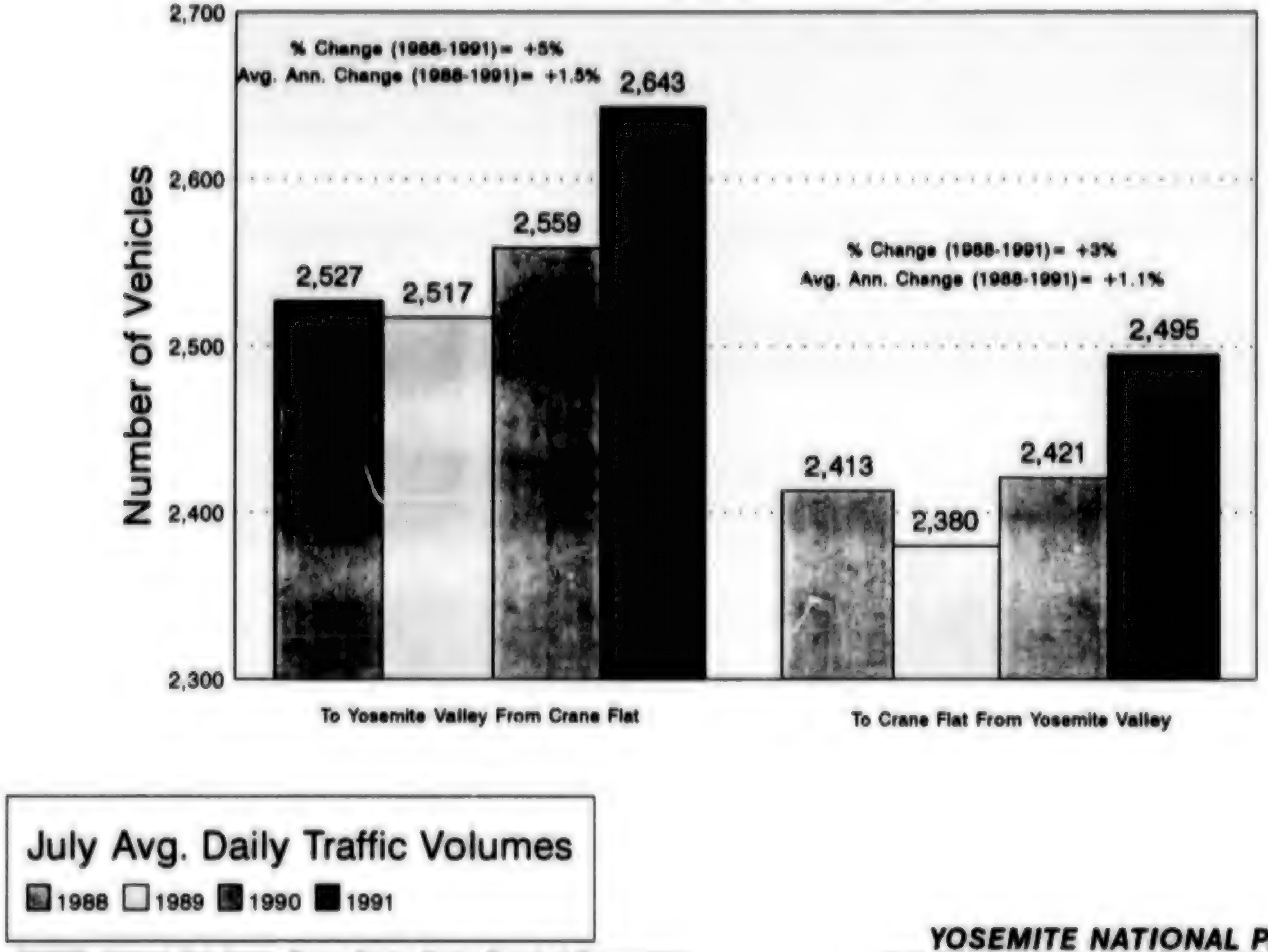
▨ 1988 ☐ 1989 ▨ 1990 ■ 1991

SOURCE: National Park Service, Denver Service Center Branch of Transportation

YOSEMITE NATIONAL PARK

Traffic Counts on Tioga Pass Road (North of Big Oak Flat Road)

TRAFFIC COUNTS ON BIG OAK FLAT ROAD, EAST OF TIOGA PASS ROAD



SOURCE: National Park Servie, Denver Service Center Branch of Transportation

YOSEMITE NATIONAL PARK
Traffic Counts On Big Oak Flat Road (E. of Tioga Pass Rd.)

Appendix 6: Yosemite Access and VTS Alternative Cost Estimates

Yosemite Transit Alternative Cost Estimates

Alternative: Grizzly Giant Staging Area (With Small Courtesy Shuttle Bus)

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	3 Sml. Bus	$155,000	$465,000	$74,400	$539,400	$0	$539,400
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	3,960 L.F.	$90	$356,400	$110,484	$466,884	$89,100	$555,984
Construction of Bridge	1 Lump Sum	$1,168,000	$1,168,000	$362,080	$1,530,080	$292,000	$1,822,080
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	Utilize Existing Facilities						
Fuel Storage Tank(s)	1,000 Gal	$2.50	$2,500	$775	$3,275	$625	$3,900
Parking							
- Auto	190 Spaces	$2,070	$393,300				
- RV	10 Spaces	$4,480	$44,800				
- Bus	10 Spaces	$5,734	$57,340				
Total	210 Spaces		$495,140	$153,493	$648,633	$123,785	$772,418
Revegetation/Landscaping	Percentage	5% Pkng	$24,757	$7,675	$32,432	$6,189	$38,621
Total Capital Costs			**$3,536,797**	**$1,022,907**	**$4,559,704**	**$761,699**	**$5,321,403**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	381		$3.50	$1,334
Total Oper. & Maint. Costs				**$1,334**
Daily GMP Visitation				**3,850**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	11,430		$3.50	$40,005
Monthly Oper. & Maint. Costs				**$40,005**
Monthly GMP Visitation				**115,500**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$4,753,003	30	$383,027
Equipment	$568,400	15	$62,407
Operation and Maintenance	$360,045	N.A.	$360,045
Total Annualized Cost			$805,480
Total Annual GMP Visitors			854,700
Annual Cost/Visitor			**$0.94**

Note: – Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
– Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
– Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994.

Yosemite Transit Alternative Cost Estimates

Alternative: [illegible] Meadow Staging Area Conventional Shuttle Bus Transit (With Small Courtesy Shuttle Bus)

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	6 Conv. Bus	$187,500	$1,125,000	$180,000	$1,305,000	$0	$1,305,000
	3 Sml. Bus	$155,000	$465,000	$74,400	$539,400	$0	$539,400
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	5,280 L.F.	$90	$475,200	$147,312	$622,512	$118,800	$741,312
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	2,000 S.F.	$579	$1,158,000	$358,980	$1,516,980	$289,500	$1,806,480
Fuel Storage Tank(s)	2,000 Gal	$2.50	$5,000	$1,550	$6,550	$1,250	$7,800
Parking							
- Auto	275 Spaces	$2,070	$569,250				
- RV	15 Spaces	$4,450	$66,750				
- Bus	0 Spaces	$5,734	$0				
Total	290 Spaces		$636,000	$197,160	$833,160	$159,000	$992,160
Minimum Passenger Facilities							
- Staging Shelters	1 Bldg	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
- Restrooms	1 Unit	$110,000	$110,000	$34,100	$144,100	$27,500	$171,600
- Revegetation/Landscaping (Staging Area)	Percentage	5% Prkg. & Bldg	$87,300	$27,063	$114,363	$21,825	$136,188
Total Capital Costs			$6,086,500	$1,644,565	$7,731,065	$1,117,875	$8,848,940

Daily Operation and Maintenance Costs

Daily Vehicle Miles	1,133		$3.50	$3,966
Total Oper. & Maint. Costs				$3,966
Daily GMP Visitation				3,840

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	33,990		$3.50	$118,965
Monthly Oper. & Maint. Costs				$118,965
Monthly GMP Visitation				115,200

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$6,975,540	20	$562,134
Equipment	$1,873,400	15	$205,689
Operation and Maintenance	$1,070,685	N.A.	$1,070,685
Total Annualized Cost			$1,838,508
Total Annual GMP Visitors			854,700
Annual Cost/Visitor			$2.15

Note: - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994

Yosemite Transit Alternative Cost Estimates

Alternative: Wawona Staging Area Conventional Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	10 Conv. Bus	$187,500	$1,875,000	$300,000	$2,175,000	$0	$2,175,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	2,000 S.F.	$579	$1,158,000	$358,980	$1,516,980	$289,500	$1,806,480
Fuel Storage Tank(s)	4,000 Gal.	$2.50	$10,000	$3,100	$13,100	$2,500	$15,600
Parking							
– Auto	335 Spaces	$2,070	$693,450				
– RV	18 Spaces	$4,450	$80,100				
– Bus	0 Spaces	$5,734	$0				
Total	353 Spaces		$773,550	$239,801	$1,013,351	$193,388	$1,206,739
Minimum Passenger Facilities							
– Staging Shelters	1 Bldg.	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
– Restrooms	1.2 Units	$110,000	$132,000	$40,920	$172,920	$33,000	$205,920
– Revegetation/Landscaping (Staging Area)	Percentage	5% Pkng. & Bldg.	$95,278	$29,536	$124,814	$23,819	$148,633
Total Capital Costs			$6,068,829	$1,596,337	$7,665,164	$1,042,207	$8,707,371

Daily Operation and Maintenance Costs

Daily Vehicle Miles	1,805		$3.50	$6,318
Total Oper. & Maint. Costs				$6,318
Daily GMP Visitation				3,850

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	54,150		$3.50	$189,525
Monthly Oper. & Maint. Costs				$189,525
Monthly GMP Visitation				115,500

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$6,503,371	30	$524,083
Equipment	$2,204,000	15	$241,987
Operation and Maintenance	$1,706,725	N.A.	$1,706,725
Total Annualized Cost			$2,471,795
Total Annual GMP Visitors			854,700
Annual Cost/Visitor			$2.89

Note - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: [redacted] Inc., 1994

Yosemite Transit Alternative Cost Estimates

Alternative: Tuolumne Voluntary Low Floor Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	15 Lift. Bus	$350,000	$5,250,000	$840,000	$6,090,000	$0	$6,090,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	2,640 L.F.	$90	$237,600	$73,656	$311,256	$59,400	$370,656
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	15 Buses	$76,000	$1,140,000	$353,400	$1,493,400	$285,000	$1,778,400
Fuel Storage Tank(s)	6,000 Gal	$2.50	$15,000	$4,650	$19,650	$3,750	$23,400
Parking							
– Auto	421 Spaces	$2,070	$871,470				
– RV	23 Spaces	$4,450	$102,350				
– Bus	5 Spaces	$5,734	$28,670				
Total	449 Spaces		$1,002,490	$310,772	$1,313,262	$250,623	$1,563,884
Minimum Passenger Facilities							
– Staging Shelters	1 Bldg	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
– Restrooms	1.5 Units	$110,000	$165,000	$51,150	$216,150	$41,250	$257,400
– Revegetation/Landscaping (Staging Area)	Percentage	5% Prkng. & Bldg.	$108,375	$33,596	$141,971	$27,094	$169,064
Total Capital Costs			$9,943,465	$2,291,224	$12,234,689	$1,167,118	$13,401,806

Daily Operation and Maintenance Costs

Daily Vehicle Miles	2,330		$3.75	$8,738
Total Oper. & Maint. Costs				$8,738
Daily GMP Visitation				4,793

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	69,900		$3.75	$262,125
Monthly Oper. & Maint. Costs				$262,125
Monthly GMP Visitation				143,790

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$7,282,806	30	$586,893
Equipment	$6,119,000	15	$671,833
Operation and Maintenance	$1,048,500	N.A.	$1,048,500
Total Annualized Cost			$2,307,226
Total Annual GMP Visitors			517,844
Annual Cost/Visitor			$4.46

Note: – Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non – transportation staff.
– Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
– Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994.

Yosemite Transit Alternative Cost Estimates
Alternative: Tuolumne Mandatory Low Floor Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	18 Lfr. Bus	$350,000	$6,300,000	$1,008,000	$7,308,000	$0	$7,308,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	2,640 L.F.	$90	$237,600	$73,656	$311,256	$59,400	$370,656
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	18 Buses	$76,000	$1,368,000	$424,080	$1,792,080	$342,000	$2,134,080
Fuel Storage Tank(s)	8,000 Gal	$2.50	$20,000	$6,200	$26,200	$5,000	$31,200
Parking							
- Auto	626 Spaces	$2,070	$1,295,820				
- RV	33 Spaces	$4,450	$146,850				
- Bus	5 Spaces	$5,734	$28,670				
Total	664 Spaces		$1,471,340	$456,115	$1,927,455	$367,835	$2,295,290
Minimum Passenger Facilities							
- Staging Shelters	1.5 Bldgs	$1,000,000	$1,500,000	$465,000	$1,965,000	$375,000	$2,340,000
- Restrooms	2.2 Units	$110,000	$242,000	$75,020	$317,020	$60,500	$377,520
- Revegetation/Landscaping (Staging Area)	Percentage	5% Plng. & Bldg.	$160,667	$49,807	$210,474	$40,167	$250,641
Total Capital Costs			**$12,324,607**	**$2,871,878**	**$15,196,485**	**$1,499,902**	**$16,696,387**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	3,148		$3.75	$11,805
Total Oper. & Maint. Costs				**$11,805**
Daily GMP Visitation				**4,793**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	94,440		$3.75	$354,150
Monthly Oper. & Maint. Costs				**$354,150**
Monthly GMP Visitation				**143,790**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$9,359,387	30	$754,239
Equipment	$7,337,000	15	$805,563
Operation and Maintenance	$1,416,600	N.A.	$1,416,600
Total Annualized Cost			$2,976,402
Total Annual GMP Visitors			517,644
Annual Cost/Visitor			**$5.75**

Note: - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994.

Yosemite Transit Alternative Cost Estimates
Alternative: Valley Conventional and Low Floor Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	11 Lfr. Bus	$350,000	$3,850,000	$616,000	$4,466,000	$0	$4,466,000
	21 Conv. Bus	$187,500	$3,937,500	$630,000	$4,567,500	$0	$4,567,500
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	5,280 L.F.	$90	$475,200	$147,312	$622,512	$118,800	$741,312
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	32 Bays	$76,000	$2,432,000	$753,920	$3,185,920	$608,000	$3,793,920
Fuel Storage Tank(s)	10,000 Gal	$2.50	$25,000	$7,750	$32,750	$6,250	$39,000
Parking							
--Auto	1,752 Spaces	$2,070	$3,626,640				
--RV	92 Spaces	$4,452	$409,600				
--Bus	20 Spaces	$5,724	$114,480				
Total	1,864 Spaces		$4,150,720	$1,286,723	$5,437,443	$1,037,680	$6,475,123
Minimum Passenger Facilities							
- Staging Shelters	2 Bldgs	$1,000,000	$2,000,000	$620,000	$2,620,000	$500,000	$3,120,000
- Restrooms	6 Units	$110,000	$660,000	$204,600	$864,600	$165,000	$1,029,600
- Revegetation/Landscaping (Staging Area)	Percentage	5% Plng. & Bldg	$340,536	$105,566	$446,102	$85,134	$531,236
Total Capital Costs			**$18,895,956**	**$4,685,871**	**$23,581,827**	**$2,770,864**	**$26,352,691**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	4,800		$3.60	$17,280
Total Oper. & Maint. Costs				$17,280
Daily GMP Visitation				16,241

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	146,580		$3.60	$527,688
Monthly Oper. & Maint. Costs				$527,688
Monthly GMP Visitation				487,230

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Amortized
Facilities	$17,290,191	30	$1,393,354
Equipment	$9,062,500	15	$995,014
Operation and Maintenance	$4,749,192	N.A.	$4,749,192
Total Annualized Cost			$7,137,560
Total Annual GMP Visitors			4,009,503
Annual Cost/Visitor			$1.78

Note: - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non-transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994

Yosemite Transit Alternative Cost Estimates
Alternative: Valley Articulated Shuttle Bus Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	23 Art. Bus	$307,500	$7,072,500	$1,131,600	$8,204,100	$0	$8,204,100
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of Access Road	5,280 L.F.	$90	$475,200	$147,312	$622,512	$118,800	$741,312
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	23 Buses	$125,400	$2,884,200	$894,102	$3,778,302	$721,050	$4,499,352
Fuel Storage Tank(s)	6,000 Gal	$3.33	$20,000	$6,200	$26,200	$5,000	$31,200
Parking							
- Auto	1,752 Spaces	$2,070	$3,626,640				
- RV	92 Spaces	$4,450	$409,400				
- Bus	20 Spaces	$5,734	$114,680				
Total	1,864 Spaces		$4,150,720	$1,286,723	$5,437,443	$1,037,680	$6,475,123
Minimum Passenger Facilities							
- Staging Shelters	2 Bldgs	$1,000,000	$2,000,000	$620,000	$2,620,000	$500,000	$3,120,000
- Restrooms	6 Units	$110,000	$660,000	$204,600	$864,600	$165,000	$1,029,600
- Revegetation/Landscaping (Staging Area)	Percentage	5% Pkng. & Bldg.	$340,536	$105,566	$446,102	$85,134	$531,236
Total Capital Costs			**$18,628,156**	**$4,710,103**	**$23,338,259**	**$2,882,664**	**$26,220,923**

Daily Operation and Maintenance Costs

Daily Vehicle Miles	3,257		$3.70	$12,051
Total Oper. & Maint. Costs				**$12,051**
Daily GMT Visitation				**18,241**

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	97,710		$3.70	$361,527
Monthly Oper. & Maint. Costs				**$361,527**
Monthly GMT Visitation				**547,230**

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$17,987,823	30	$1,449,574
Equipment	$8,233,100	15	$903,950
Operation and Maintenance	$3,253,743	N.A.	$3,253,743
Total Annualized Cost			$5,607,267
Total Annual GMT Visitors			4,049,500
Annual Cost/Visitor			**$1.38**

Note: - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994.

Yosemite Transit Alternative Cost Estimates

Alternative: Valley Light Rail Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	16 Trains	$2,000,000	$32,000,000	$5,120,000	$37,120,000	$0	$37,120,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of LRT Line	7.58 Miles	$17,500,000	$132,650,000	41,121,500	$173,771,500	$33,162,500	$206,934,000
Construction of Access Road	5,280 L.F.	$90	$475,200	$147,312	$622,512	$118,800	$741,312
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	16 Trains	$240,000	$3,840,000	$1,190,400	$5,030,400	$960,000	$5,990,400
Electrification Upgrade	Estimate	$10,000,000	$10,000,000	$3,100,000	$13,100,000	$2,500,000	$15,600,000
Parking							
- Auto	1,752 Spaces	$2,070	$3,626,640				
- RV	92 Spaces	$4,450	$409,400				
- Bus	20 Spaces	$5,734	$114,680				
Total	1,864 Spaces		$4,150,720	$1,286,723	$5,437,443	$1,037,680	$6,475,123
Minimum Passenger Facilities							
- Staging Shelters	2 Bldgs	$1,000,000	$2,000,000	$620,000	$2,620,000	$500,000	$3,120,000
- Restrooms	6 Units	$110,000	$660,000	$204,600	$864,600	$165,000	$1,029,600
- Revegetation/Landscaping (Staging Area)	Percentage	5% Plng. & Bldg.	$340,536	$105,566	$446,102	$85,134	$531,236
Total Capital Costs			$187,141,456	$53,210,101	$240,351,557	$38,779,114	$279,130,671

Daily Operation and Maintenance Costs

Daily Vehicle Miles	2,172		$10.00	$21,720
Total Oper. & Maint. Costs				$21,720
Daily GMP Visitation				19,241

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	65,160		$10.00	$651,600
Monthly Oper. & Maint. Costs				$651,600
Monthly GMP Visitation				547,236

Annualized Cost Per Visitor
(7% Compound Interest)

	Total Costs	Life(Yrs)	Annualized
Facilities	$241,981,671	30	$19,500,433
Equipment	$37,149,000	25	$3,187,775
Operation and Maintenance	$5,864,400	N.A.	$5,864,400
Total Annualized Cost			$28,552,608
Total Annual GMP Visitors			4,048,502
Annual Cost/Visitor			$7.05

Note: - Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non - transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

Source: BRW, Inc., 1994.

Yosemite Transit Alternative Cost Estimates

Alternative: Valley Elevated People-Mover Transit

Capital Costs

Item	Units	Cost Per Unit	Net cost	Supervision & Contingency	Gross Cost	Planning	Total Cost
Vehicles	12 Trains	$3,900,000	$46,800,000	$7,488,000	$54,288,000	$0	$54,288,000
Radio System	1 System	$25,000	$25,000	$4,000	$29,000	$0	$29,000
Construction of LRT Line	7.58 Miles	$26,500,000	$200,870,000	$62,269,700	$263,139,700	$50,217,500	$313,357,200
Construction of Access Road	5,280 L.F.	$90	$475,200	$147,312	$622,512	$118,800	$741,312
Construction of Stations	20 Stations	$1,800,000	$36,000,000	$11,160,000	$47,160,000	$9,000,000	$56,160,000
Utility Extensions (Water, Sewer, Etc.)	Lump Sum	$1,000,000	$1,000,000	$310,000	$1,310,000	$250,000	$1,560,000
Maintenance Facility	12 Trains	$300,000	$3,600,000	$1,116,000	$4,716,000	$900,000	$5,616,000
Electrification Upgrade	Estimate	$10,000,000	$10,000,000	$3,100,000	$13,100,000	$2,500,000	$15,600,000
Parking							
– Auto	1,752 Spaces	$2,070	$3,626,640				
– RV	92 Spaces	$4,450	$409,400				
– Bus	20 Spaces	$5,734	$114,680				
Total	1,864 Spaces		$4,150,720	$1,286,723	$5,437,443	$1,037,680	$6,475,123
Minimum Passenger Facilities							
– Staging Shelters	2 Bldg.	$1,000,000	$2,000,000	$620,000	$2,620,000	$500,000	$3,120,000
– Restrooms	6 Units	$110,000	$660,000	$204,600	$864,600	$165,000	$1,029,600
– Revegetation/Landscaping (Staging Area)	Percentage	5% Pkng. & Bldg.	$340,536	$105,566	$446,102	$85,134	$531,236
Total Capital Costs			$305,921,456	$87,811,801	$393,733,257	$64,774,114	$458,507,471

Daily Operation and Maintenance Costs

Daily Vehicle Miles	1,788		$11.00	$19,668
Total Oper. & Maint. Costs				$19,668
Daily GMP Visitation				18,241

Peak Month (30 day period) Operation and Maintenance Costs

Monthly Vehicle Miles	53,640		$11.00	$590,040
Monthly Oper. & Maint. Costs				$590,040
Monthly GMP Visitation				547,230

Annualized Cost Per Visitor
(7% Compound Interest)

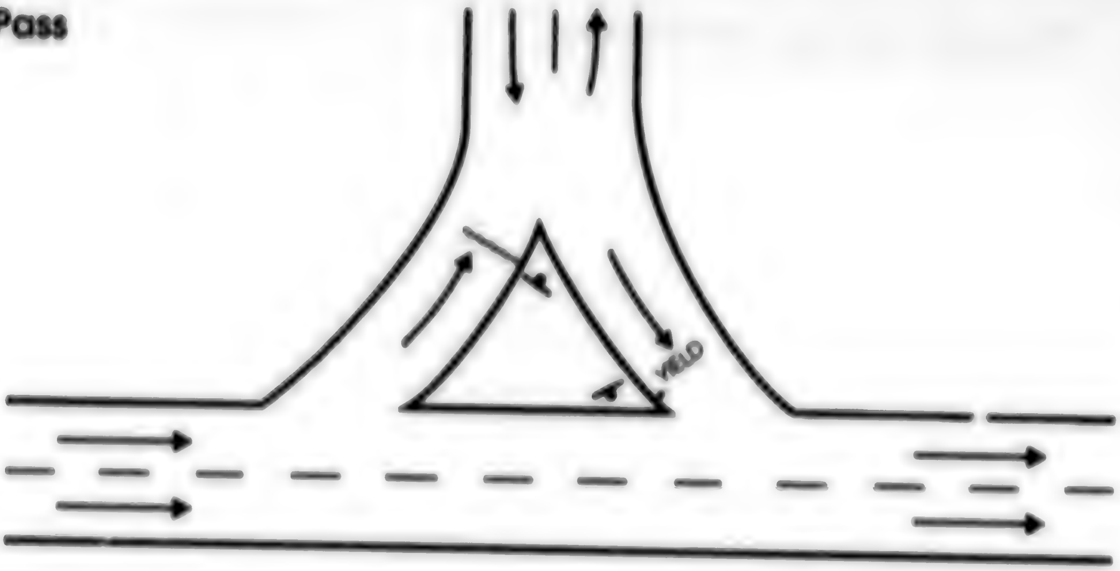
	Total Costs	Life(Yrs)	Anualized
Facilities	$404,190,471	30	$32,572,256
Equipment	$54,317,000	25	$4,660,970
Operation and Maintenance	$5,310,360	N.A.	$5,310,360
Total Annualized Cost			$42,543,586
Total Annual GMP Visitors			4,048,502
Annual Cost/Visitor			$10.51

Note:
- Items not estimated for cost include ancillary visitor service facilities, facility relocations, signing, employee housing, special landscaping or lighting, utility vehicles and non–transportation staff.
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

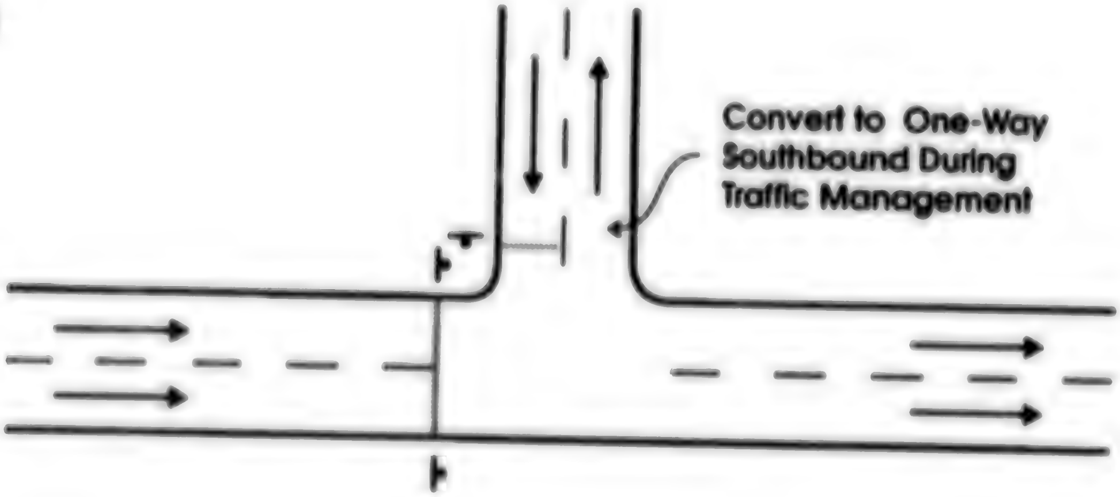
Source: BRW, Inc., 1994.

Appendix 7: Existing Intersection Configurations at Key Yosemite Valley Locations

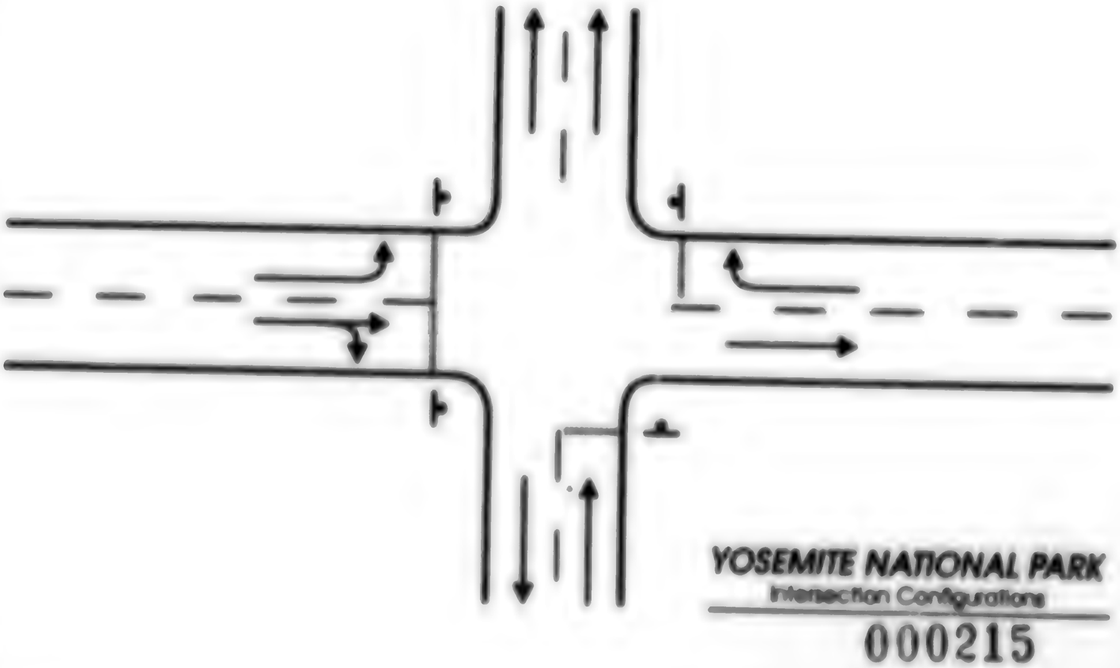
El Capitan By-Pass



Sentinel Bridge

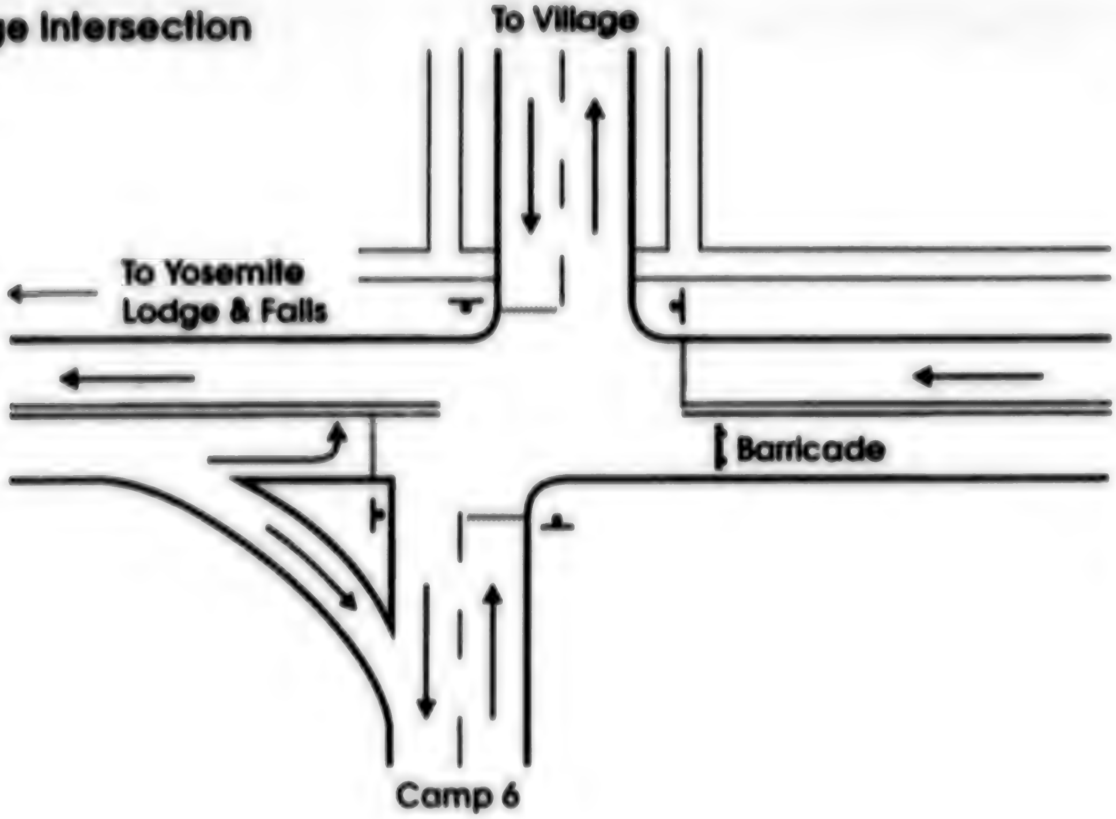


Curry 4-Way

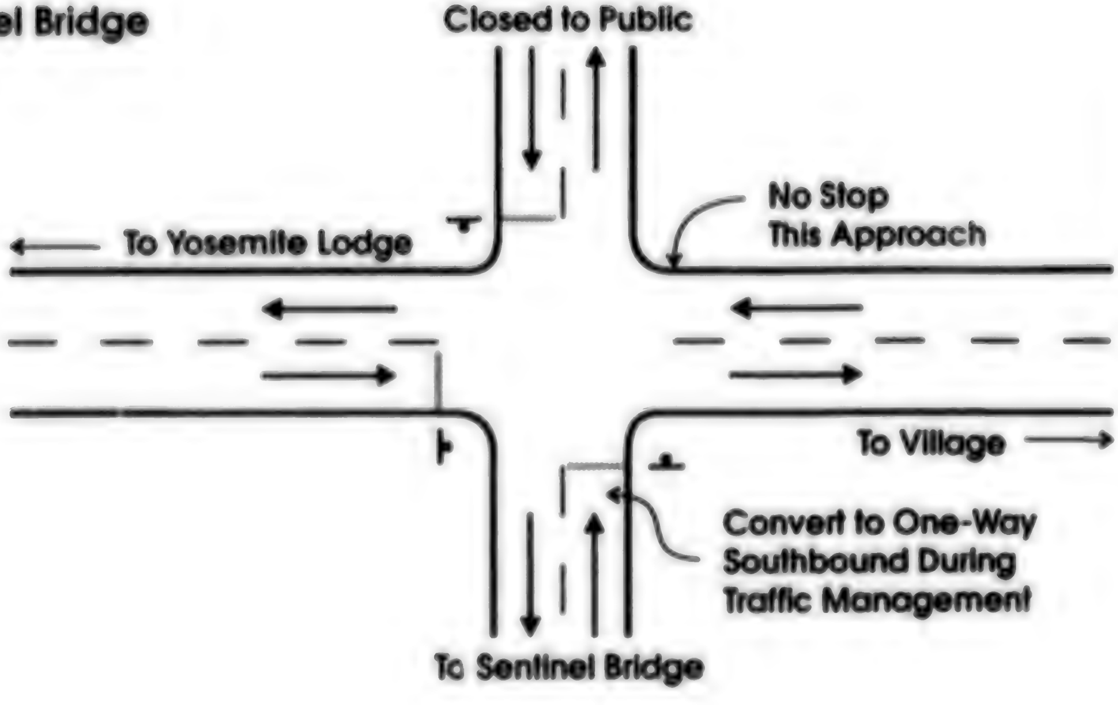


YOSEMITE NATIONAL PARK
Intersection Configurations

Yosemite Village Intersection



North of Sentinel Bridge



Appendix 8: Yosemite VTS Alternative Information Summaries

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Mariposa Grove VTS Alternative Definition

Grizzly Giant Parking Area Alternative
(With Small Courtesy Shuttle Bus for Campground/Hotel Guests)

	Courtesy Bus
Round Trip Route Length (miles)	19.06
Number of Stop Locations	3
Number of Stops	5
Travel Speed (mph)	25
Daily Boardings	1,200
Peak Hourly Peak Direction Passengers	83
Vehicle Capacity (passengers)	42
Peak Service Intervals (min.)	30.0
Off-Peak Service Intervals (min.)	30.0
Travel Time From Wawona Hotel to Grove (min.)	23.4
Vehicles Operating During Peak Service	2
During Off-Peak Service	2
Fleet Size	3
Daily Vehicle Round Trips	20
Daily Vehicle Hours	20
Daily Vehicle Miles	381
Daily Fuel Consumption (gal.)	59
Maintenance Facility	
- Building Space (s.f.)	2,000
- Vehicle Storage Space (s.f.)	2,250
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	7

Mariposa Grove VTS Alternative Definition

Grizzly Giant Parking Area Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking (s.f.)	107,852
Auto Spaces = 190	
R.V. Spaces = 10	
Bus Spaces = 10	
- Visitor Facilities (s.f.)	1,568
- Total (s.f.)	109,420
	2.5 Acres

Facilities Relocation

- Visitor Information Center Would Be Necessary at Staging Area

Roadway and Parking Issues

- Wawona Store Would Be Relieved of Shuttle Parkers
- Segment of New Roadway Required to Access New Parking Area
- Eliminate Existing Visitor and Bus Parking Areas in Lower Grove

Mariposa Grove VTS Alternative Definition

Goat Meadow Staging Area Conventional Shuttle Bus Transit Alternative
(With Small Courtesy Shuttle Bus for Campground/Hotel Guests)

	Shuttle Bus	Courtesy Bus	Combined
Round Trip Route Length (miles)	7.10	17.61	24.71
Number of Stop Locations	2	3	5
Number of Stops	3	5	8
Travel Speed (mph)	25	25	
Daily Boardings	5,346	1,200	
Peak Hourly Peak Direction Passengers	458	83	
Vehicle Capacity (passengers)	50	42	
Peak Service Intervals (min.)	6.0	30.0	
Off-Peak Service Intervals (min.)	12.0	30.0	
Travel Time From Goat Meadow to Grove (min.)	8.5		
Travel Time From Wawona Hotel to Grove (min.)		21.6	
Vehicles Operating During Peak Service	5	2	7
During Off-Peak Service	2	2	4
Fleet Size	6	3	9
Daily Vehicle Round Trips	110	20	130
Daily Vehicle Hours	52	20	72
Daily Vehicle Miles	781	352	1,133
Daily Fuel Consumption (gal.)	195	54	249
Maintenance Facility			
- Building Space (s.f.)			2[illegible]00
- Vehicle Storage Space (s.f.)			8[illegible]03
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			21

Mariposa Grove VTS Alternative Definition

Goat Meadow Staging Area Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking (s.f.)	140,360
Auto Spaces = 275	
R.V. Spaces = 15	
- Visitor and Transit Facilities (s.f.)	3,488
- Total (s.f.)	143,848
	3.3 Acres

Facilities Relocation

- Visitor Information Center Would Be Valuable at Staging Area

Roadway and Parking Issues

- Wawona Store Would Be Relieved of Shuttle Parkers
- Eliminate Existing Visitor Parking Area in Lower Grove
- Retain Existing Bus Parking Area in Lower Grove

Mariposa Grove VTS Alternative Definition

Wawona Staging Area Conventional Shuttle Bus Transit Alternative

	Shuttle Bus
Round Trip Route Length (miles)	16.41
Number of Stop Locations	4
Number of Stops	7
Travel Speed (mph)	25
Daily Boardings	6,546
Peak Hourly Peak Direction Passengers	458
Vehicle Capacity (passengers)	50
Peak Service Intervals (min.)	6.0
Off-Peak Service Intervals (min.)	12.0
Travel Time From Wawona to Mariposa Grove (mi	20.7
Vehicles Operating During Peak Service	9
During Off-Peak Service	4
Fleet Size	10
Daily Vehicle Round Trips	110
Daily Vehicle Hours	96
Daily Vehicle Miles	1,805
Daily Fuel Consumption (gal.)	451
Maintenance Facility	
- Building Space (s.f.)	2,000
- Vehicle Storage Space (s.f.)	9,671
Transportation Staff (Drivers, Mechanics, Laborers, Managers)	25

Mariposa Grove VTS Alternative Definition

Wawona Staging Area Conventional Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking (s.f.) Auto Spaces = 335 R.V. Spaces = 18	170,852
- Visitor and Transit Facilities (s.f.)	3,488
- Total (s.f.)	174,340 4.0 Acres

Facilities Relocation

- Visitor Information Center Would Be Valuable at Staging Area

Roadway and Parking Issues

- Wawona Store Would Be Relieved of Shuttle Parkers
- Eliminate Existing Visitor Parking Area in Lower Grove
- Retain Existing Bus Parking Area in Lower Grove

Tuolumne Meadows VTS Alternative Definition

Voluntary Low Floor Shuttle Bus Transit Alternative

	Meadows Circ.	Tioga Access	Combined
Round Trip Route Length (miles)	13.26	28.03	41.29
Number of Stop Locations	12	17	29
Number of Stops	23	33	56
Travel Speed (mph)	15	25	
Daily Access and Egress Boardings*	3,604	2,402	
Peak Hourly Peak Direction Passengers	330	220	
Vehicle Capacity (passengers)	60	60	
Peak Service Intervals (min.)	10.0	15.0	
Off-Peak Service Intervals (min.)	30.0	30.0	
Travel Time From Gravel Pit to John Muir Trail (mi	29.9		
Travel Time From Gravel Pit to Olmsted (min.)		37.0	
Vehicles Operating During Peak Service	7	6	13
During Off-Peak Service	2	3	5
Fleet Size	8	7	15
Daily Vehicle Round Trips	70	50	120
Daily Vehicle Hours	80	75	155
Daily Vehicle Miles	928	1,402	2,330
Daily Fuel Consumption (gal.)	309	467	776
Maintenance Facility			
- Building Space (s.f.)			2,000
- Vehicle Storage Space (s.f.)			13,088
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			39

* Assumes two boardings per visitor. Additional linked trips may occur.

Tuolumne Meadows VTS Alternative Definition

Voluntary Low Floor Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking (s.f.)	220,422
Auto Spaces = 421	
R.V. Spaces = 23	
Bus Spaces = 5	
- Visitor and Transit Facilities (s.f.)	3,535
- Total (s.f.)	223,957
	5.1 Acres

Facility Relocation Opportunities
- Visitor Center to Staging Area
- Main Visitor Store and Grill to Staging Area
- Service Station to Staging Area

Roadway and Parking Issues
- Eliminate Informal Day-Use Trailhead Parking
- Eliminate Roadside Strip Parking

Tuolumne Meadows VTS Alternative Definition

Mandatory Low Floor Shuttle Bus Transit Alternative

	Meadows Circ.	Tioga Access	Combined
Round Trip Route Length (miles)	13.26	28.03	41.29
Number of Stop Locations	12	17	29
Number of Stops	23	33	56
Travel Speed (mph)	15	25	
Daily Access and Egress Boardings*	4,624	3,082	
Peak Hourly Peak Direction Passengers	424	283	
Vehicle Capacity (passengers)	60	60	
Peak Service Intervals (min.)	7.5	12.0	
Off-Peak Service Intervals (min.)	15.0	20.0	
Travel Time From Gravel Pit to John Muir Trail (mi	29.9		
Travel Time From Gravel Pit to Olmsted (min.)		37.0	
Vehicles Operating During Peak Service	9	7	16
During Off-Peak Service	5	4	9
Fleet Size	10	8	18
Daily Vehicle Round Trips	100	65	165
Daily Vehicle Hours	115	90	205
Daily Vehicle Miles	1,326	1,822	3,148
Daily Fuel Consumption (gal.)	442	607	1,049
Maintenance Facility			
- Building Space (s.f.)			2,363
- Vehicle Storage Space (s.f.)			17,407
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			49

* Assumes two boardings per visitor. Additional linked trips may occur.

[illegible]

Tuolumne Meadows VTS Alternative Definition

Mandatory Low Floor Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements	
- Day-Use Parking (s.f.)	324,482
Auto Spaces = 626	
R.V. Spaces = 33	
Bus Spaces = 5	
- Visitor and Transit Facilities (s.f.)	3,697
- Total (s.f.)	328,179
	7.5 Acres

Facility Relocation Opportunities
- Visitor Center to Staging Area
- Main Visitor Store and Grill to Staging Area
- Service Station to Staging Area

Roadway and Parking Issues
- Eliminate Day-Use Trailhead Parking
- Eliminate Roadside Strip Parking

Yosemite Valley VTS Alternative Definition

Conventional and Low Floor Shuttle Bus Transit Alternative

	Conventional Bus Connector	Low Floor Bus Circulator	Combined
Round Trip Route Length (miles)	8.33	6.82	15.15
Number of Stop Locations	9	11	20
Number of Stops	15	21	36
Travel Speed (mph)	15 & 20	15	
Daily Access and Egress Boardings*	18,174	24,000	
Peak Hourly Peak Direction Passengers	1,272	750	
Vehicle Capacity (passengers)	50	60	
Peak Service Intervals (min.)	2.0	4.0	
Off-Peak Service Intervals (min.)	4.0	4.0	
Travel Time From Taft Toe to Camp 6 (min.)	10.1		
Travel Time From Camp 6 to Happy Isles (min.)		11.6	
Vehicles Operating During Peak Service	19	10	29
During Off-Peak Service	10	10	20
Fleet Size	21	11	32
Daily Vehicle Round Trips	390	240	630
Daily Vehicle Hours	250	160	410
Daily Vehicle Miles	3,249	1,637	4,886
Daily Fuel Consumption (gal.)	812	546	1,358
Maintenance Facility			
- Building Space (s.f.)			4,200
- Vehicle Storage Space (s.f.)			30,946
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			92

* Assumes two boardings per visitor. Additional linked trips may occur.

Yosemite Valley VTS Alternative Definition

Conventional and Low Floor Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking and Overnight Visitor Short-Term Parking (s.f.)	946,651
Auto Spaces = 1,752	
R.V. Spaces = 92	
Bus Spaces = 20	
- Visitor and Transit Facilities (s.f.)	10,440
- Total (s.f.)	957,091 22.0 Acres

Facilities Relocation

- Visitor Center to Staging Area
- Main Visitor Store to Curry Village
- River Campgrounds to Upper Pines Area
- Group Camp to Upper Pines Area
- Stables to Unspecified Location
- North Pines Campground to Upper Pines Area

Roadway and Parking Issues

- Close North Valley Loop Drive to General Vehicles From Yosemite Lodge to Pohono Bridge
- Develop Camp 6 for Tour Bus and Special Needs Parking
- Eliminate General Vehicle and VTS Traffic from Stoneman Bridge Road
- Widen South Loop Drive Between Pohono Bridge and Staging Area
- Eliminate VTS Traffic on Loop Road Between Happy Isles and Lower Pines
- Provide Designated El Capitan Viewing and Climber Parking Area
- Eliminate Visitor Parking from All Activity Areas Except for Reserved Parking Spaces at Lodging Sites and Campgrounds
- Provide Limited Parking for Disabled Access Only
- Consider Short-Term Parking for Campers Shopping at the Curry Village Store

Yosemite Valley VTS Alternative Definition

Articulated Shuttle Bus Transit Alternative

	Connector	Circulator	Combined
Round Trip Route Length (miles)	8.33	6.82	15.15
Number of Stop Locations	9	11	20
Number of Stops	15	21	36
Travel Speed (mph)	15 & 20	15	
Daily Access and Egress Boardings*	18,174	24,000	
Peak Hourly Peak Direction Passengers	1,272	750	
Vehicle Capacity (passengers)	75	75	
Peak Service Intervals (min.)	3.0	6.0	
Off-Peak Service Intervals (min.)	6.0	6.0	
Travel Time From Taft Toe to Camp 6 (min.)	10.1		
Travel Time From Camp 6 to Happy Isles (min.)		11.6	
Vehicles Operating During Peak Service	13	7	20
During Off-Peak Service	7	7	14
Fleet Size	15	8	23
Daily Vehicle Round Trips	260	160	420
Daily Vehicle Hours	172	112	284
Daily Vehicle Miles	2,166	1,091	3,257
Daily Fuel Consumption (gal.)	722	364	1,086
Maintenance Facility			
- Building Space (s.f.)			4,981
- Vehicle Storage Space (s.f.)			25,841
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			66

* Assumes two boardings per visitor. Additional linked trips may occur.

Yosemite Valley VTS Alternative Definition

Articulated Shuttle Bus Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking and Overnight Visitor Short-Term Parking (s.f.)	946,651
Auto Spaces = 1,752	
R.V. Spaces = 92	
Bus Spaces = 20	
- Visitor and Transit Facilities (s.f.)	11,640
- Total (s.f.)	958,291
	22.0 Acres

Facilities Relocation

- Visitor Center to Staging Area
- Main Visitor Store to Curry Village
- River Campgrounds to Upper Pines Area
- Group Camp to Upper Pines Area
- Stables to Unspecified Location
- North Pines Campground to Upper Pines Area

Roadway and Parking Issues

- Close North Valley Loop Drive to General Vehicles From Yosemite Lodge to Pohono Bridge
- Develop Camp 6 for Tour Bus and Special Needs Parking
- Eliminate General Vehicle and VTS Traffic from Stoneman Bridge Road
- Widen South Loop Drive Between Pohono Bridge and Staging Area
- Eliminate VTS Traffic on Loop Road Between Happy Isles and Lower Pines
- Provide Designated El Capitan Viewing and Climber Parking Area
- Eliminate Visitor Parking from All Activity Areas Except for Reserved Parking Spaces at Lodging Sites and Campgrounds
- Provide Limited Parking for Disabled Access Only
- Consider Short-Term Parking for Campers Shopping at the Curry Village Store

Yosemite Valley VTS Alternative Definition

Light Rail Transit Alternative

	Connector	Circulator	Combined
Round Trip Route Length (miles)	8.33	6.82	15.15
Number of Stop Locations	9	11	20
Number of Stops	15	21	36
Travel Speed (mph)	15 & 20	15	
Daily Access and Egress Boardings*	18,174	24,000	
Peak Hourly Peak Direction Passengers	1,272	750	
Vehicle Capacity (passengers)	120	120	
Peak Service Intervals (min.)	5.0	7.5	
Off-Peak Service Intervals (min.)	10.0	7.5	
Travel Time From Taft Toe to Camp 6 (min.)	10.1		
Travel Time From Camp 6 to Happy Isles (min.)		11.6	
Vehicles Operating During Peak Service	8	6	14
During Off-Peak Service	4	6	10
Fleet Size	9	7	16
Daily Vehicle Round Trips	156	128	284
Daily Vehicle Hours	104	96	200
Daily Vehicle Miles	1,299	873	2,172
Daily Fuel Consumption (gal.)	0	0	0
Power Requirements	600-750 Volts, D.C.	600-750 Volts, D.C.	
Maintenance Facility			
- Building Space (s.f.)			28,160
- Vehicle Storage Space (s.f.)			16,320
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			47

* Assumes two boardings per visitor. Additional linked trips may occur.

Yosemite Valley VTS Alternative Definition

Light Rail Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking and Overnight Visitor Short-Term Parking (s.f.)	946,651
Auto Spaces = 1,752	
R.V. Spaces = 92	
Bus Spaces = 20	
- Visitor and Transit Facilities (s.f.)	12,600
- Total (s.f.)	959,251
	22.0 Acres

Facilities Relocation

- Visitor Center to Staging Area
- Main Visitor Store to Curry Village
- River Campgrounds to Upper Pines Area
- Group Camp to Upper Pines Area
- Stables to Unspecified Location
- North Pines Campground to Upper Pines Area

Roadway and Parking Issues

- Close North Valley Loop Drive to General Vehicles From Yosemite Lodge to Pohono Bridge
- Develop Camp 6 for Tour Bus and Special Needs Parking
- Eliminate General Vehicle and VTS Traffic from Stoneman Bridge Road
- Widen South Loop Drive Between Pohono Bridge and Staging Area
- Eliminate VTS Traffic on Loop Road Between Happy Isles and Lower Pines
- Provide Designated El Capitan Viewing and Climber Parking Area
- Eliminate Visitor Parking from All Activity Areas Except for Reserved Parking Spaces at Lodging Sites and Campgrounds
- Provide Limited Parking for Disabled Access Only
- Consider Short-Term Parking for Campers Shopping at the Curry Village Store

Yosemite Valley VTS Alternative Definition

Elevated People Mover Transit Alternative

	Connector	Circulator	Combined
Round Trip Route Length (miles)	8.33	6.82	15.15
Number of Stop Locations	9	11	20
Number of Stops	15	21	36
Travel Speed (mph)	15 & 25	15	
Daily Access and Egress Boardings*	18,174	24,000	
Peak Hourly Peak Direction Passengers	1,272	750	
Vehicle Capacity (passengers)	147	147	
Peak Service Intervals (min.)	6.0	10.0	
Off-Peak Service Intervals (min.)	10.0	10.0	
Travel Time From Taft Toe to Camp 6 (min.)	9.3		
Travel Time From Camp 6 to Happy Isles (min.)		11.6	
Vehicles Operating During Peak Service	6	4	10
During Off-Peak Service	4	4	8
Fleet Size	7	5	12
Daily Vehicle Round Trips	136	96	232
Daily Vehicle Hours	84	64	148
Daily Vehicle Miles	1,133	655	1,788
Daily Fuel Consumption (gal.)	0	0	0
Power Requirements	600-750 Volts, D.C.	600-750 Volts, D.C.	
Maintenance Facility			
- Building Space (s.f.)			21,120
- Vehicle Storage Space (s.f.)			14,310
Transportation Staff (Drivers, Mechanics, Laborers, Managers)			36

* Assumes two boardings per visitor. Additional linked trips may occur.

Yosemite Valley VTS Alternative Definition

Elevated People Mover Transit Alternative

Related Facilities and Issues:

Staging Area Space Requirements

- Day-Use Parking and Overnight Visitor Short-Term Parking (s.f.)	946,651
Auto Spaces = 1,752	
R.V. Spaces = 92	
Bus Spaces = 20	
- Visitor and Transit Facilities (s.f.)	13,560
- Total (s.f.)	960,211 22.0 Acres

Facilities Relocation

- Visitor Center to Staging Area
- Main Visitor Store to Curry Village
- River Campgrounds to Upper Pines Area
- Group Camp to Upper Pines Area
- Stables to Unspecified Location
- North Pines Campground to Upper Pines Area

Roadway and Parking Issues

- Close North Valley Loop Drive to General Vehicles From Yosemite Lodge to Pohono Bridge
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- Provide Limited Parking for Disabled Access Only
- Consider Short-Term Parking for Campers Shopping at the Curry Village Store

Appendix 9: Yosemite Valley Remote and In-Valley Staging Area Evaluation Work Sheets

Entry Location of Valley Visitors & Share of Valley Parking (External)

	Tioga	Big Oak	Combined Big Oak	Fish Camp	El Portal	
Peak Season Arrivals %	22%	24%	46%	27%	24%	
% Visitors Going to Valley	65%	95%		85%	95%	
Valley Factor	14%	23%		23%	23%	
Percent of Valley Visits	17%	28%	45%	28%	28%	
Daily Valley Day–Use Visitors	1,568	2,501	4,069	2,517	2,501	9,087
Peak Hourly Visitor Arrivals	220	350	570	352	350	1,272
Auto Occupancy	2.9	2.9	2.9	2.9	2.9	
Peak Hourly Vehicle Arrivals	76	121	196	122	121	635

Length of Stay in Valley (hrs)	4	4	4	
Transit Travel Time (min)	124.0	162.0	96.0	
Transit Wait Time (min)	4.0	6.0	6.0	
Total Length of Stay (hrs)	6.1	6.8	5.7	
Parking Required	**1,205**	**826**	**688**	**2,719**

BRW, Inc.

03–Sep–93

Entry Location of Valley Visitors & Share of Valley Parking (Internal)

	Tioga	Big Oak	Combined Crane Flat	Bdgr Pass	El Portal	
Peak Season Arrivals %	22%	24%	46%	27%	24%	
% Visitors Going to Valley	65%	95%		85%	95%	
Valley Factor	14%	23%		23%	23%	
Percent of Valley Visits	17%	28%	45%	28%	28%	
Daily Valley Day–Use Visitors	1,568	2,501	4,069	2,517	2,501	9,087
Peak Hourly Visitor Arrivals	220	350	570	352	350	1,272
Auto Occupancy	2.9	2.9	2.9	2.9	2.9	
Peak Hourly Vehicle Arrivals	76	121	196	122	121	635

Length of Stay in Valley (hrs)	4	4	4	
Transit Travel Time (min)	84.0	102.0	96.0	
Transit Wait Time (min)	4.0	6.0	6.0	
Total Length of Stay (hrs)	5.5	5.8	5.7	
Parking Required	1,074	705	688	2,467

Yosemite Valley Remote Staging (External) Alternatives Evaluation

Location	Private Vehicle Parking Spaces Required	Parking Area Required (acres)	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	Bus VMT/ Day	Bus VMT/ Year	Bus Fleet Size	Parking Space Net Costs	Parking Space Total Costs	Bus Fleet Net Costs	Bus Fleet Total Costs	Total Capital Costs	Daily Oper. & Maint. Costs	Annual Oper. & Maint. Costs	Avg. Delay to Through Visitor (min.)
Taft Toe	**1,844**	**20.5**	**8.3**	**38.0**	**40.0**	**2.0**	**4.0**	**19**	**10**	**3,249**	**877,149**	**21**	**$4,036,040**	**$6,296,222**	**$3,937,500**	**$4,567,500**	**$10,863,722**	**$11,695**	**$3,157,736**	**23.0**
Fish Camp	826	9.2	64.7	162.0	160.0	6.0	10.0	27	16	8,799	2,375,784	30	$1,808,114	$2,820,658	$5,625,000	$6,525,000	$9,345,658	$31,677	$8,552,822	168.0
El Portal	688	7.6	29.7	96.0	100.0	6.0	10.0	16	10	4,042	1,091,318	18	$1,506,032	$2,349,410	$3,375,000	$3,915,000	$6,264,410	$14,551	$3,928,746	102.0
Big Oak Flat	1,205	13.4	47.6	124.0	127.5	4.0	7.5	31	17	9,421	2,543,627	35	$2,637,745	$4,114,882	$6,562,500	$7,612,500	$11,727,382	$33,915	$9,157,056	128.0
Total	**2,719**	**30.2**	**142.0**	**382.0**	**387.5**			**74**	**43**	**22,262**	**6,010,729**	**83**	**$5,951,891**	**$9,284,950**	**$15,562,500**	**$18,052,500**	**$27,337,450**	**$80,143**	**$21,638,625**	**131.8**
Diff. from Taft Toe	**875**	**9.7**	**133.7**	**344.0**	**347.5**			**55**	**33**	**19,013**	**5,133,580**	**62**	**$1,915,851**	**$2,988,728**	**$11,625,000**	**$13,485,000**	**$16,473,728**	**$68,448**	**$18,480,889**	**108.8**
Badger Pass	705	7.8	39.4	102.0	110.0	6.0	10.0	17	11	5,353	1,445,299	19	$1,543,245	$2,407,462	$3,562,500	$4,132,500	$6,539,962	$19,271	$5,203,077	108.0
El Portal	688	7.6	29.7	96.0	100.0	6.0	10.0	16	10	4,042	1,091,318	18	$1,506,032	$2,349,410	$3,375,000	$3,915,000	$6,264,410	$14,551	$3,928,746	102.0
Crane Flat	1,074	11.9	31.5	84.0	90.0	4.0	7.5	21	12	6,233	1,682,921	24	$2,350,986	$3,667,538	$4,500,000	$5,220,000	$8,887,538	$22,439	$6,058,515	88.0
Total	**2,467**	**27.4**	**100.6**	**282.0**	**300.0**			**54**	**33**	**15,628**	**4,219,538**	**61**	**$5,400,263**	**$8,424,410**	**$11,437,500**	**$13,267,500**	**$21,691,910**	**$56,261**	**$15,190,338**	**97.4**
Diff. from Taft Toe	**623**	**6.9**	**92.2**	**244.0**	**260.0**			**35**	**23**	**12,379**	**3,342,389**	**40**	**$1,364,223**	**$2,128,188**	**$7,500,000**	**$8,700,000**	**$10,828,188**	**$44,566**	**$12,032,602**	**74.4**

Annualized					
In-Valley	$507,390	$501,487	$1,008,877	$3,157,736	$4,166,613
Out of park	$748,241	$1,982,067	$2,730,308	$21,638,625	$24,368,933
In park	$678,893	$1,456,700	$2,135,593	$15,190,338	$17,325,931

Notes
- Taft Toe route goes to Yosemite Lodge (travel delay to Camp 6)
- Remote staging routes go to Camp 6
- Bus spaces not included in Taft Toe parking area required and parking space capital costs
- Bus capacity = 60 passengers for Taft Toe option
- Bus capacity = 40 passengers for all other options
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning
- Annualized at 7% (15 year equipment life, 30 year facility life)

Yosemite Valley Staging Area (Internal) Alternatives
Daily Private Vehicle Miles of Travel In Valley

Location	Access From North & West Distances (miles)			Access From South Distances (miles)			North & West Vehicle Demand	South Vehicle Demand	Total Vehicle Demand	North Access VMT	South Access VMT	Total VMT
	Enter	Exit	Total	Enter	Exit	Total						
Taft Toe	2.40	2.40	4.80	1.45	3.28	4.73	2,271	862	3,133	10,901	4,079	14,980
Yellow Pine	4.10	6.82	10.92	3.15	7.70	10.85	2,271	862	3,133	24,801	9,356	34,157
Pohono Quarry	0.00	0.00	0.00	3.85	0.88	4.73	2,271	862	3,133	0	4,079	4,079

Staging Area Requirements

Daily Visitors via Transit to Valley	9,087
Vehicle Occupancy	2.9
Daily Private Vehicles using Staging Areas	3,133

Proportion of Valley Bound Traffic by Direction

Entrance	%
Tioga	17%
Big Oak	28%
South	28%
El Portal	28%
Total	100%

Direction	% of Total	Vehicles
North	72%	2,271
South	28%	862

Yosemite Valley Remote Staging (Internal) Alternatives Evaluation

Conventional Bus

Location	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	Bus VMT/ Day	Bus VMT/ Year	Private Veh. VMT/ Day	Private Veh. VMT/ Year	Bus Fleet Size	Bus Fleet Net Costs	Bus Fleet Total Costs	Alignment Net Cost	Alignment Total Costs	Total Capital Costs	Daily Oper. & Maint. Costs	Annual Oper. & Maint. Costs
Taft Toe	8.3	38.0	40.0	2.0		19	10	3,249	877,149	14,980	3,325,560	21	$3,937,500	$4,567,500	NA	NA	$4,567,500	$11,695	$3,157,736
Yellow Pine	5.1	28.0	28.0	2.0	4.0	14	7	1,970	531,765	34,157	7,582,854	16	$3,000,000	$3,480,000	NA	NA	$3,480,000	$7,090	$1,914,354
Pohono Quarry	13.4	54.0	56.0	2.0	4.0	27	14	5,218	1,408,914	4,079	905,538	30	$5,625,000	$6,525,000	NA	NA	$6,525,000	$18,786	$5,072,090

Articulated Bus

Location	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	Bus VMT/ Day	Bus VMT/ Year	Private Veh. VMT/ Day	Private Veh. VMT/ Year	Bus Fleet Size	Bus Fleet Net Costs	Bus Fleet Total Costs	Alignment Net Cost	Alignment Total Costs	Total Capital Costs	Daily Oper. & Maint. Costs	Annual Oper. & Maint. Costs
Taft Toe	8.3	39.0	42.0	3.0	6.0	13	7	2,166	584,766	14,980	3,325,560	15	$4,612,500	$5,350,500	NA	NA	$5,350,500	$8,013	$2,163,634
Yellow Pine	5.1	27.0	30.0	3.0	6.0	9	5	1,313	354,510	34,157	7,582,854	10	$3,075,000	$3,567,000	NA	NA	$3,567,000	$4,858	$1,311,687
Pohono Quarry	13.4	54.0	54.0	3.0	6.0	18	9	3,479	939,276	4,079	905,538	20	$6,150,000	$7,134,000	NA	NA	$7,134,000	$12,872	$3,475,321

Light Rail Transit

Location	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	LRT Veh. VMT/ Day	LRT Veh. VMT/ Year	Private Veh. VMT/ Day	Private Veh. VMT/ Year	LRT Veh. Fleet Size	LRT Veh. Fleet Net Costs	LRT Veh. Fleet Total Costs	Alignment Net Cost	Alignment Total Costs	Total Capital Costs	Daily Oper. & Maint. Costs	Annual Oper. & Maint. Costs
Taft Toe	8.3	40.0	40.0	5.0	10.0	8	4	1,299	350,880	14,980	3,325,560	9	$18,000,000	$20,880,000	$72,887,500	$113,704,500	$134,584,500	$12,995	$3,508,596
Yellow Pine	5.1	30.0	30.0	5.0	10.0	6	3	788	212,706	34,157	7,582,854	7	$14,000,000	$16,240,000	$44,187,500	$68,932,500	$85,172,500	$7,878	$2,127,060
Pohono Quarry	13.4	55.0	60.0	5.0	10.0	11	6	2,087	563,566	4,079	905,538	13	$26,000,000	$30,160,000	$117,075,000	$182,637,000	$212,797,000	$20,873	$5,635,656

Group Rapid Transit

Location	Round Trip Route Length (miles)	Peak Cycle Time (min.)	Off-Peak Cycle Time (min.)	Peak Service Interval (min.)	Off-Peak Service Interval (min.)	Vehicles Operating During Peak	Vehicles Operating Off-Peak	GRT Veh. VMT/ Day	GRT Veh. VMT/ Year	Private Veh. VMT/ Day	Private Veh. VMT/ Year	GRT Veh. Fleet Size	GRT Veh. Fleet Net Costs	GRT Veh. Fleet Total Costs	Alignment and Station Net Cost	Alignment and Station Total Costs	Total Capital Costs	Daily Oper. & Maint. Costs	Annual Oper. & Maint. Costs
Taft Toe	8.3	36.0	40.0	6.0	10.0	6	4	1,133	305,878	14,980	3,325,560	7	$27,300,000	$31,668,000	$126,572,500	$197,453,100	$229,121,100	$12,462	$3,364,654
Yellow Pine	5.1	30.0	30.0	6.0	10.0	5	3	687	185,436	34,157	7,582,854	6	$23,400,000	$27,144,000	$81,312,500	$126,847,500	$153,991,500	$7,555	$2,039,796
Pohono Quarry	13.4	48.0	50.0	6.0	10.0	8	5	1,820	491,314	4,079	905,538	9	$35,100,000	$40,716,000	$193,485,000	$301,836,600	$342,552,600	$20,016	$5,404,450

Notes

- Bus capacity = 50 passengers for all options
- All routes go from staging area to Yosemite Lodge via Camp 6
- Equipment Total Costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages were applied
- Facility Total Costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning

Yosemite Valley Staging Area Evaluation
Year 2000 Summertime Running Inspection and Maintenance (I/M) Exaust Emission Calculations

	Daily Private Vehicle VMT	Daily Bus VMT	Light Duty Passenger			Light Duty Truck			Medium Duty Truck		Total Priv. Vehicle	Urban Bus	Total Emissions (grams)
			Non-Cat.	Cat.	Diesel	Non-Cat.	Cat.	Diesel	Non-Cat.	Cat.			
VMT Group %			90%	90%	90%	90%	90%	90%	10%	10%			
Proportion of Vehicle Group			0.96%	77.41%	0.20%	0.03%	21.33%	0.06%	1.04%	98.96%			
VMT Factor			0.86%	69.67%	0.18%	0.03%	19.20%	0.05%	0.10%	9.90%	99.99%		
Taft Toe Daily VMT	14,980	3,249	129	10,436	27	4	2,876	8	16	1,482	14,979		
Yellow Pine Daily VMT	34,157	1,970	294	23,797	61	9	6,557	18	36	3,380	34,154		
Pohono Quarry Daily VMT	4,079	5,218	35	2,842	7	1	783	2	4	404	4,079		
NOx Factor (grams per mile)*			2.68	0.31	1.29	1.73	0.47	1.18	2.30	0.90		20.00	
Taft Toe NOx Emission			347	3,235	35	7	1,352	10	36	1,334	6,355	64,980	71,335
Yellow Pine NOx Emission			791	7,377	79	16	3,082	22	82	3,042	14,491	39,400	53,891
Pohono Quarry NOx Emission			94	881	9	2	368	3	10	363	1,730	104,360	106,090
CO Factor (grams per mile)*			34.42	2.04	1.25	18.72	2.65	1.19	27.31	2.67		25.36	
Taft Toe CO Emission			4,455	21,290	34	76	7,621	10	425	3,956	37,868	82,395	120,263
Yellow Pine CO Emission			10,158	48,546	77	173	17,376	22	970	9,025	86,348	49,958	136,306
Pohono Quarry CO Emission			1,213	5,797	9	21	2,075	3	116	1,078	10,311	132,329	142,640
PM Factor (grams per mile)*			0.04	0.01	0.47	0.04	0.01	0.42	0.04	0.01		2.94	
Taft Toe PM Emission			5	104	13	0	29	3	1	15	170	9,552	9,722
Yellow Pine PM Emission			12	238	29	0	66	8	1	34	388	5,792	6,179
Pohono Quarry PM Emission			1	28	3	0	8	1	0	4	46	15,341	15,387

* Used 30 mph for private vehicle emission factors and 20 mph for bus emission factors. All emission factors at 75 degrees F.

Source: Methodology for Estimating Emissions from On-Road Motor Vehicles,
Volume I: EMFAC7F, State of California Air Resources Board Technical Support Division

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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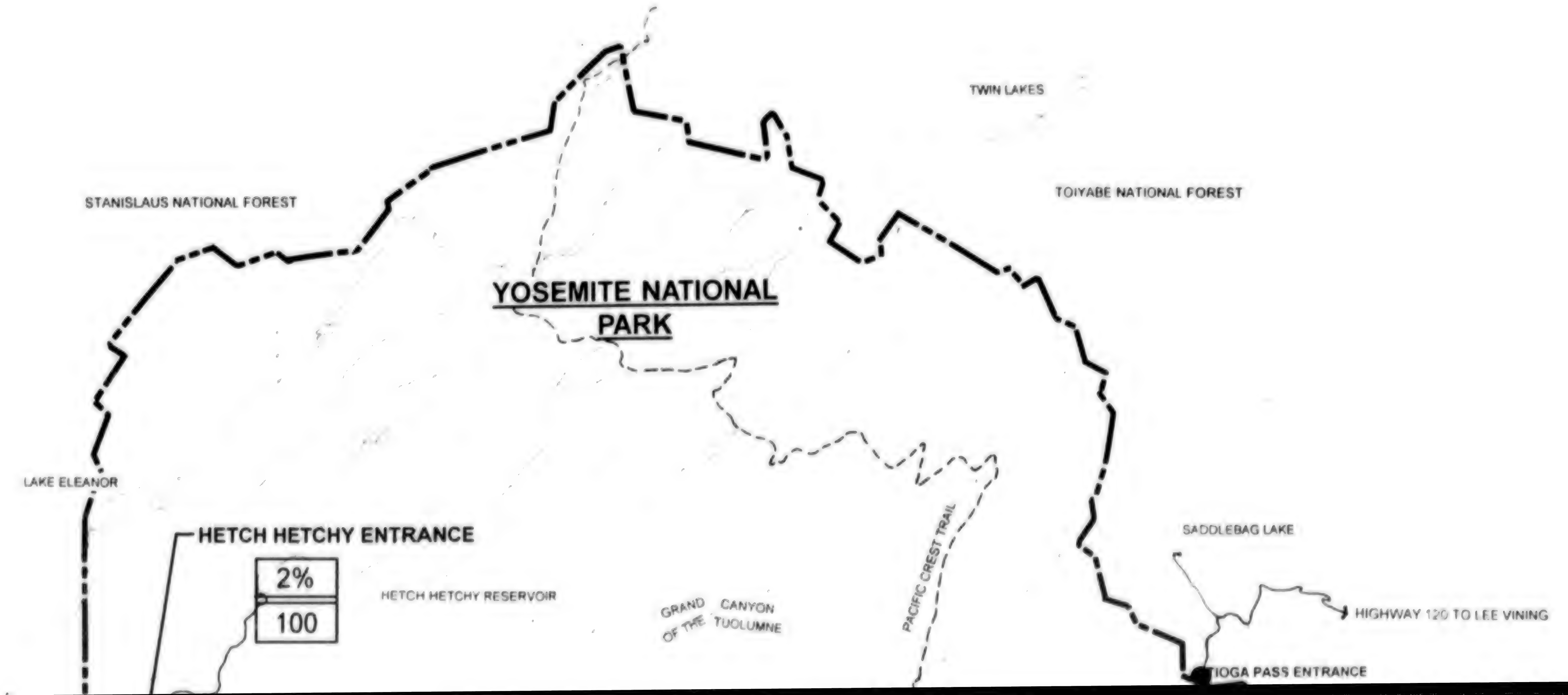
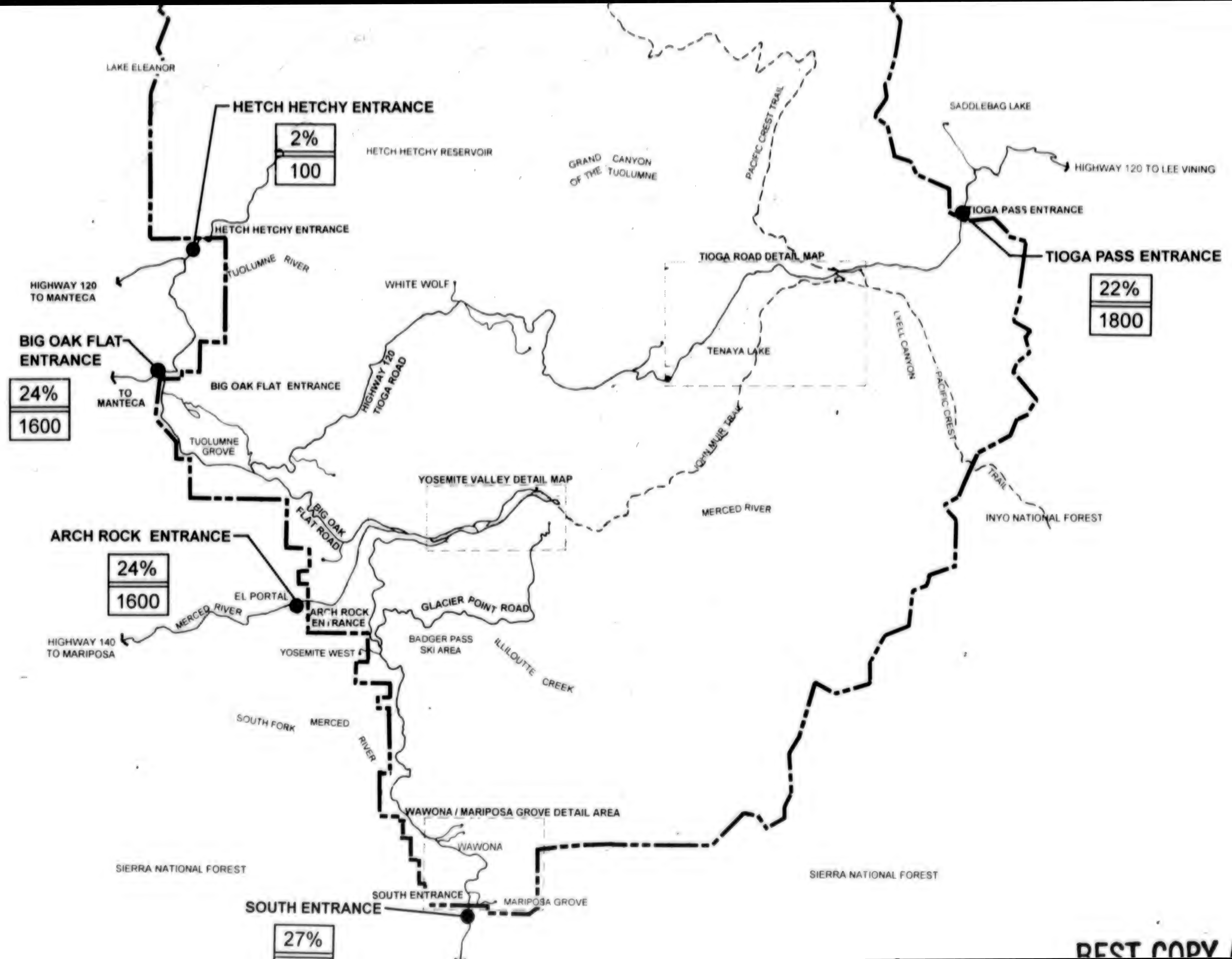
END

DATE FILMED

10/23/96

PROPORTIONS OF PEAK SEASON VEHICLE ENTRIES





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LEGEND:

10%	1992 PEAK SEASON PERCENTAGES (MAY - SEPTEMBER)
1000	1992 AVERAGE DAILY VEHICLE ENTRIES FOR AUGUST

SOURCE: MONTHLY PUBLIC USE REPORTS

0 1 5 10 MILES

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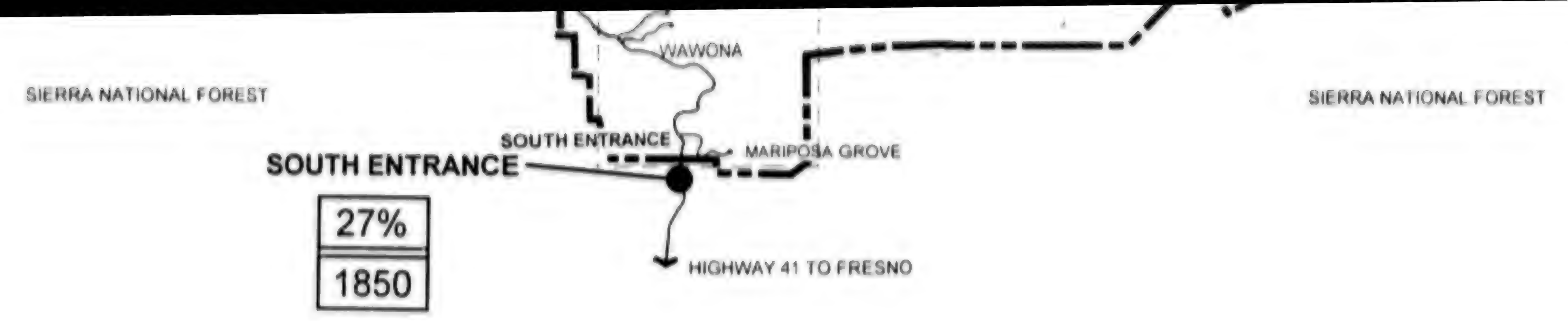
YOSEMITE
NATIONAL PARK

ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY



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YOSEMITE
NATIONAL PARK

ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

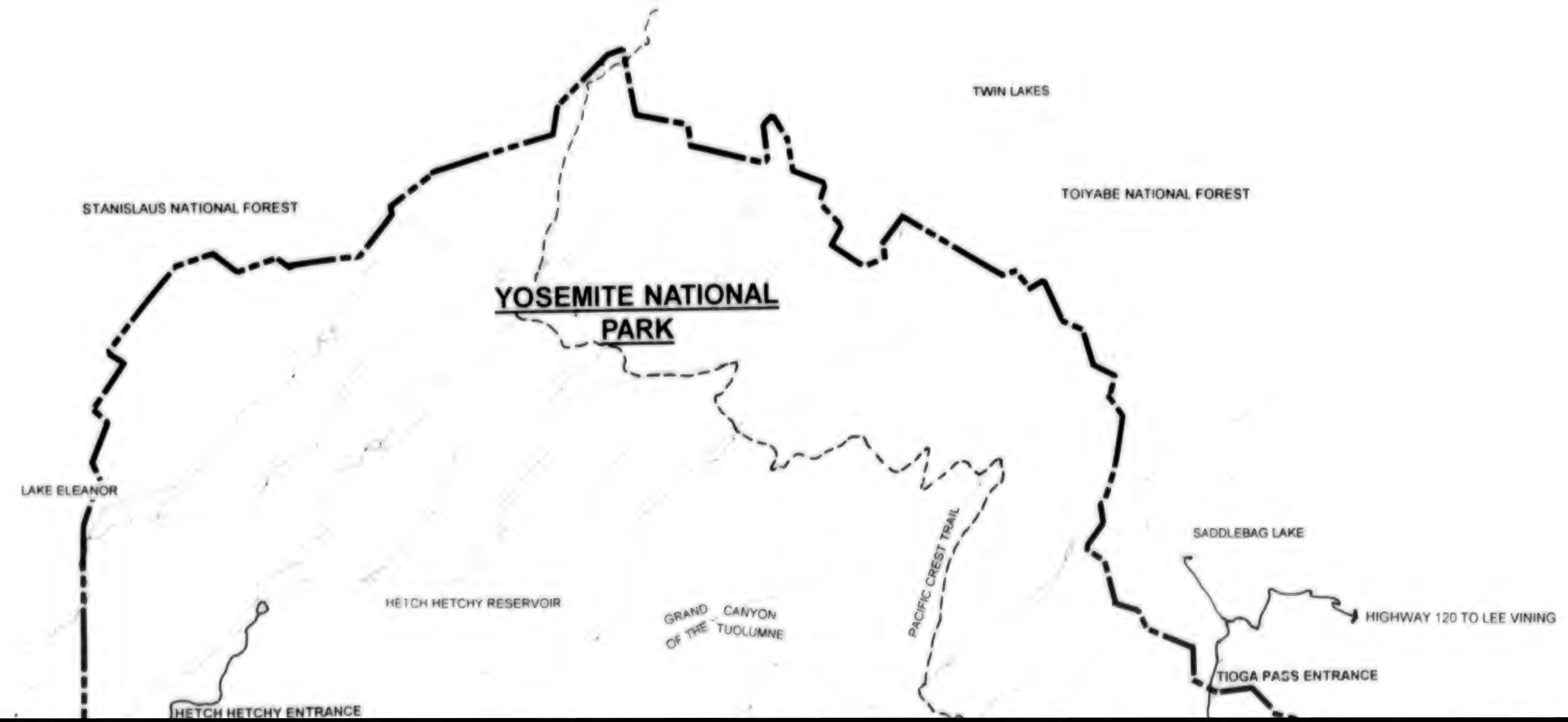
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC/SEPT-93/184 20111

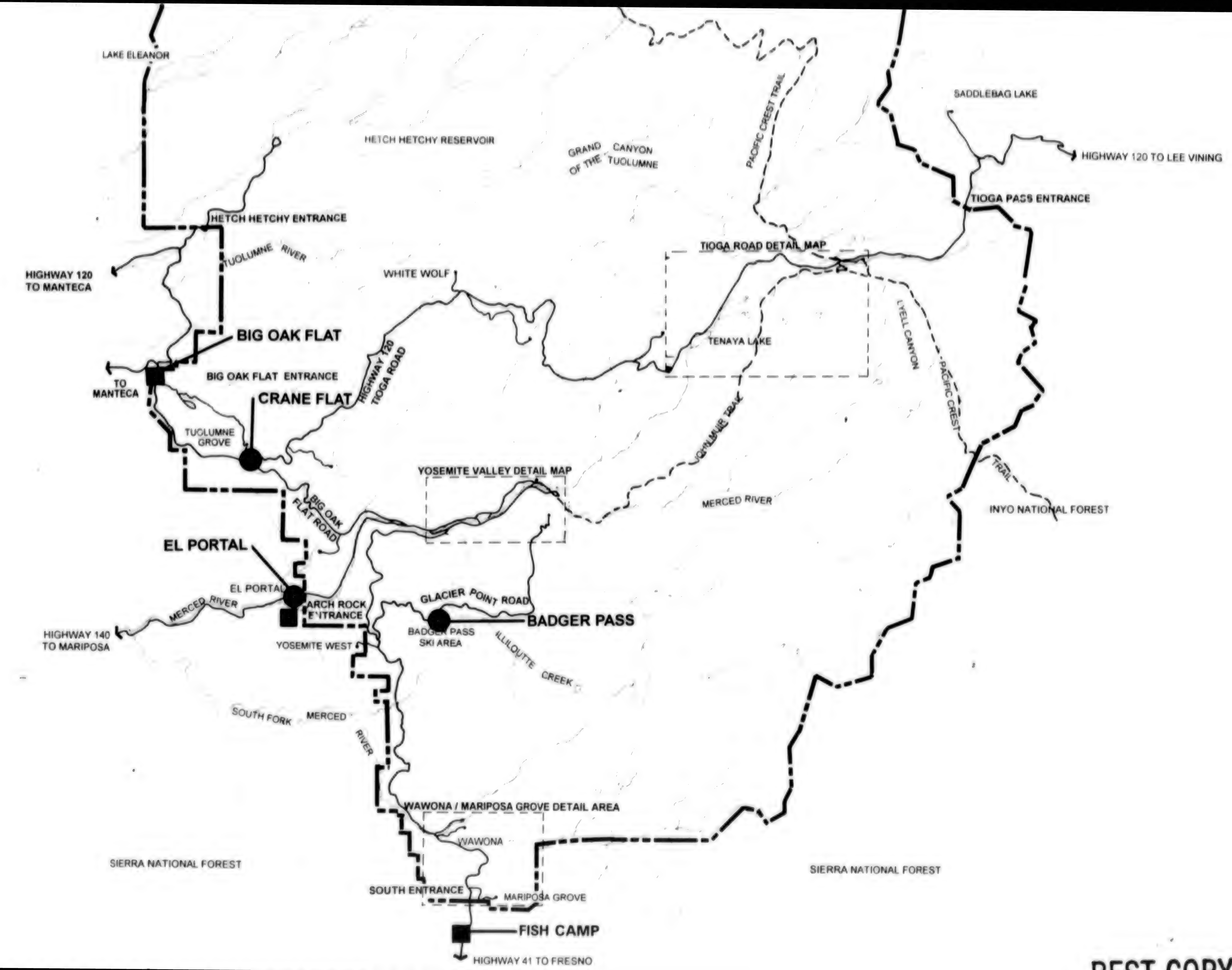
(1)

POTENTIAL REMOTE VALLEY STAGING AREAS

LEGEND:

- ● **REMOTE IN-PARK STAGING AREAS** (El Portal also included in this category)
- ■ **STAGING AREAS OUTSIDE PARK**





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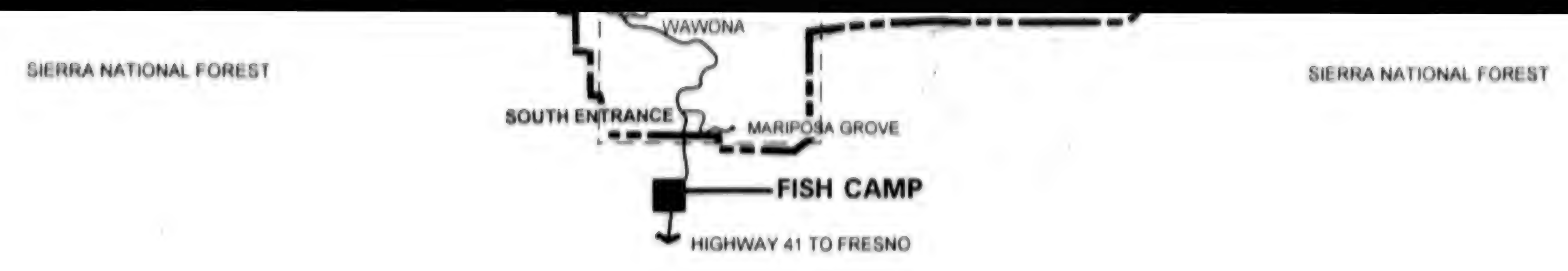
YOSEMITE

NATIONAL PARK

ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



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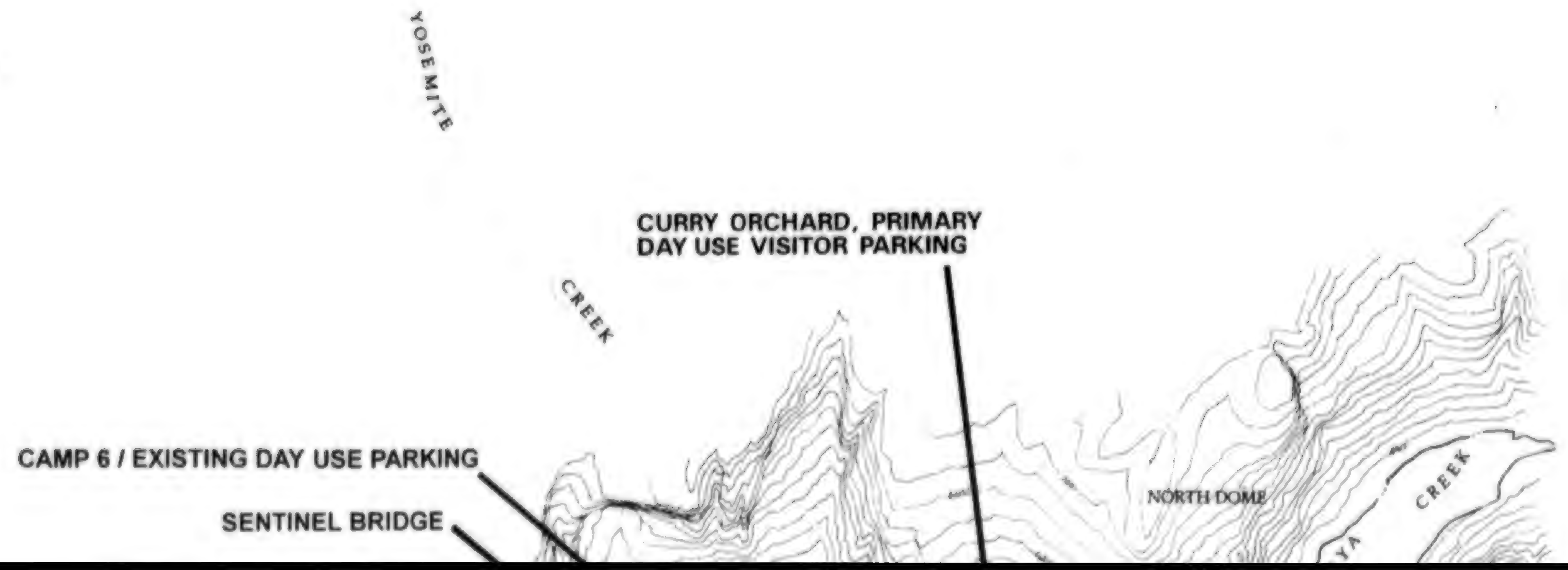
2

YOSEMITE VALLEY STAGING OPTIONS



CURRY ORCHARD, PRIMARY DAY USE VISITOR PARKING

CAMP 6 / EXISTING DAY USE PARKING

SENTINEL BRIDGE

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HIGHWAY 41 / VALLEY LOOP INTERSECTION

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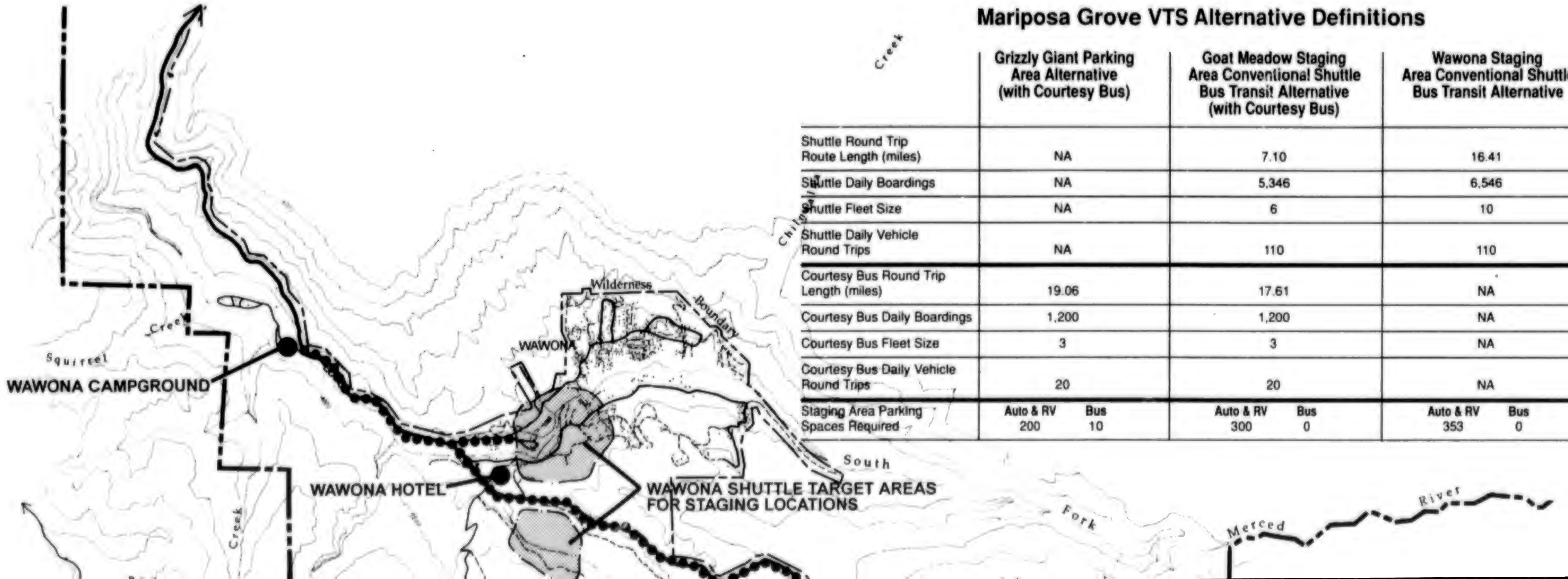
3

MARIPOSA GROVE ACCESS ALTERNATIVES

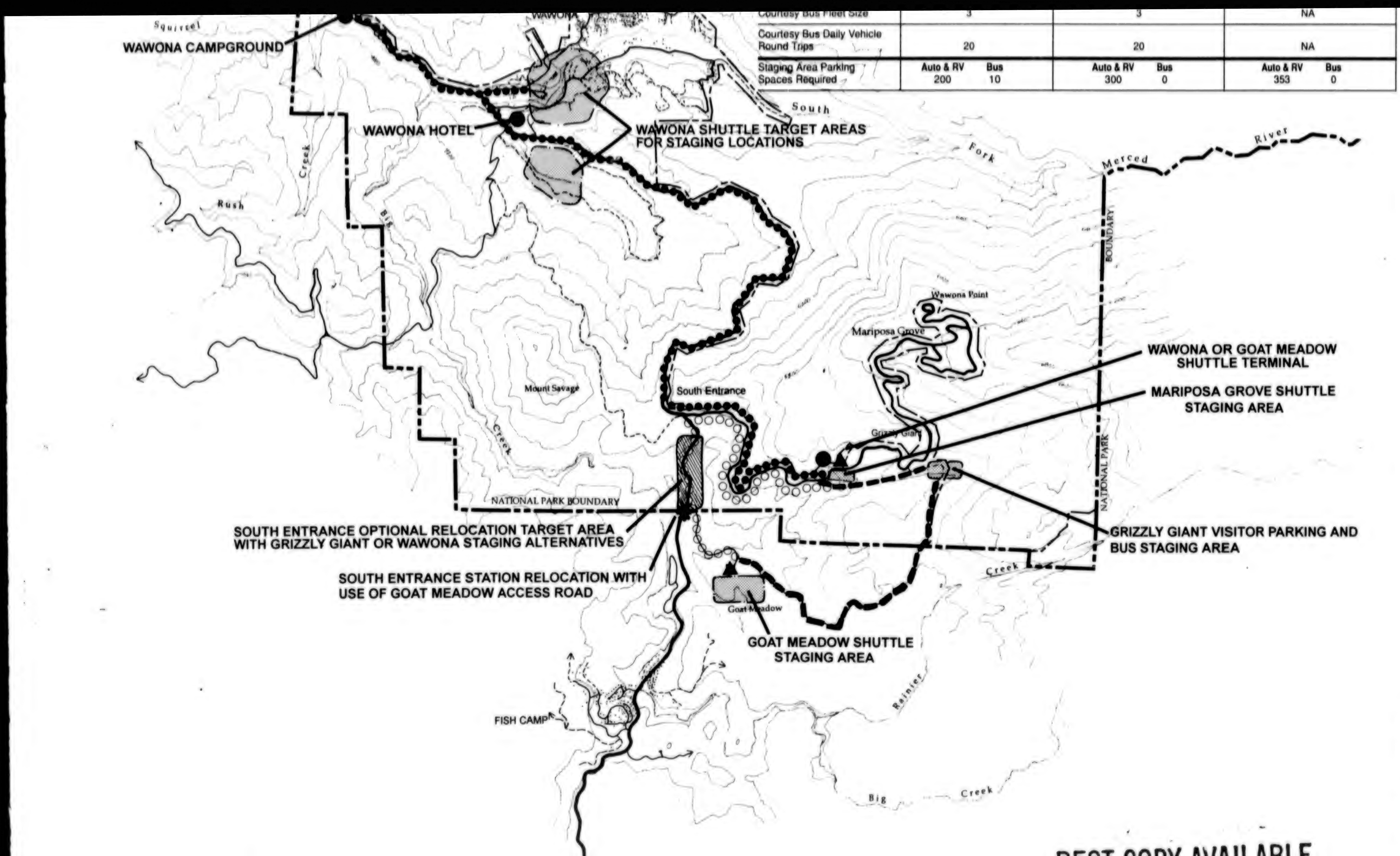
Mariposa Grove VTS Alternative Definitions

	Grizzly Giant Parking Area Alternative (with Courtesy Bus)	Goat Meadow Staging Area Conventional Shuttle Bus Transit Alternative (with Courtesy Bus)	Wawona Staging Area Conventional Shuttle Bus Transit Alternative
Shuttle Round Trip Route Length (miles)	NA	7.10	16.41
Shuttle Daily Boardings	NA	5,346	6,546
Shuttle Fleet Size	NA	6	10
Shuttle Daily Vehicle Round Trips	NA	110	110
Courtesy Bus Round Trip Length (miles)	19.06	17.61	NA
Courtesy Bus Daily Boardings	1,200	1,200	NA
Courtesy Bus Fleet Size	3	3	NA
Courtesy Bus Daily Vehicle Round Trips	20	20	NA
Staging Area Parking Spaces Required	Auto & RV 200 Bus 10	Auto & RV 300 Bus 0	Auto & RV 353 Bus 0



LEGEND:

Courtesy Bus Fleet Size	3		3		NA	
Courtesy Bus Daily Vehicle Round Trips	20		20		NA	
Staging Area Parking Spaces Required	Auto & RV 200	Bus 10	Auto & RV 300	Bus 0	Auto & RV 353	Bus 0


WAWONA CAMPGROUND
WAWONA
WAWONA HOTEL
WAWONA SHUTTLE TARGET AREAS FOR STAGING LOCATIONS
Squirrel
Creek
Rush
Big
South
Fork
Merced
River
BOUNDARY
NATIONAL PARK
Wawona Point
Mariposa Grove
Mount Savage
South Entrance
Grizzly Giant
NATIONAL PARK BOUNDARY
WAWONA OR GOAT MEADOW SHUTTLE TERMINAL
MARIPOSA GROVE SHUTTLE STAGING AREA
SOUTH ENTRANCE OPTIONAL RELOCATION TARGET AREA WITH GRIZZLY GIANT OR WAWONA STAGING ALTERNATIVES
SOUTH ENTRANCE STATION RELOCATION WITH USE OF GOAT MEADOW ACCESS ROAD
GRIZZLY GIANT VISITOR PARKING AND BUS STAGING AREA
Creek
Goat Meadow
GOAT MEADOW SHUTTLE STAGING AREA
Rainier
FISH CAMP
Big
Creek

LEGEND:

- ▬ ▬ GRIZZLY GIANT PARKING ALTERNATIVE; OPTIONAL ROADWAY ALIGNMENTS
- ○○○○○ GOAT MEADOW STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ▲ GOAT MEADOW SHUTTLE STOPS
- ●●●●● WAWONA STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ● WAWONA SHUTTLE STOPS

NOTES:
1. Separate Courtesy Shuttle Provided for Wawona Campground and Wawona Hotel Guests with Goat Meadow Staging or Grizzly Giant Parking Alternatives.
2. Tour Buses Maintain Direct Access to Mariposa Grove under each Alternative.

0 1/4 1/2 1 MILE

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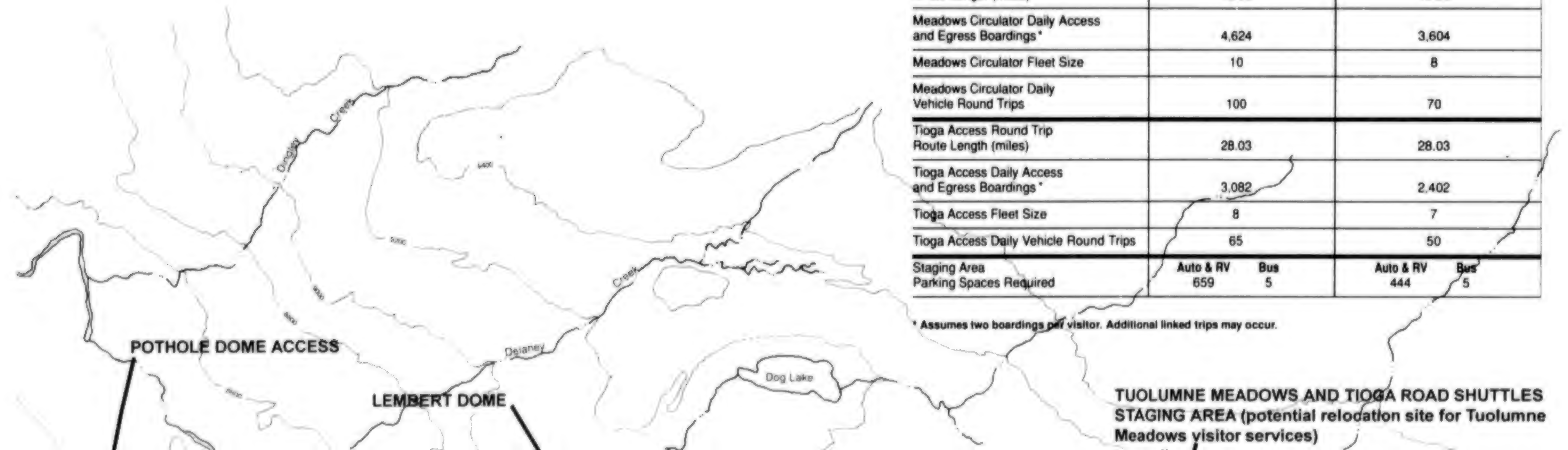
4

TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVE

Toulumne Meadows VTS Alternative Definitions

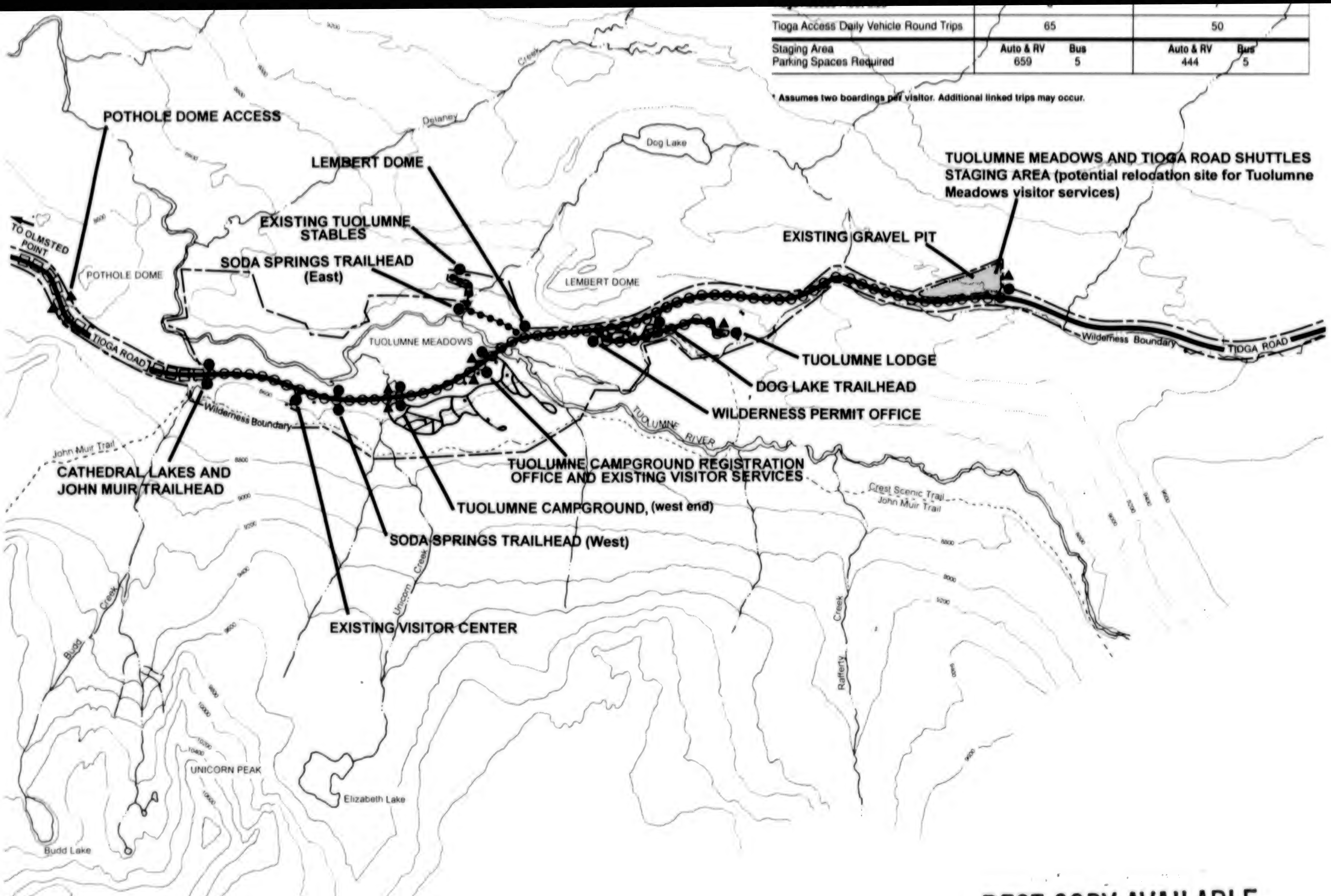
	Mandatory Low Floor Shuttle Bus Transit Alternative	Voluntary Low Floor Shuttle Bus Transit Alternative
Meadows Circulator Round Trip Route Length (miles)	13.26	13.26
Meadows Circulator Daily Access and Egress Boardings*	4,624	3,604
Meadows Circulator Fleet Size	10	8
Meadows Circulator Daily Vehicle Round Trips	100	70
Tioga Access Round Trip Route Length (miles)	28.03	28.03
Tioga Access Daily Access and Egress Boardings*	3,082	2,402
Tioga Access Fleet Size	8	7
Tioga Access Daily Vehicle Round Trips	65	50
Staging Area Parking Spaces Required	Auto & RV 659 Bus 5	Auto & RV 444 Bus 5

* Assumes two boardings per visitor. Additional linked trips may occur.


Dingley Creek
Delaney Creek
Dog Lake
POTHOLE DOME ACCESS
LEMBERT DOME
TUOLUMNE MEADOWS AND TIOGA ROAD SHUTTLES STAGING AREA (potential relocation site for Tuolumne Meadows visitor services)

Tioga Access Daily Vehicle Round Trips	65		50	
Staging Area Parking Spaces Required	Auto & RV 659	Bus 5	Auto & RV 444	Bus 5

* Assumes two boardings per visitor. Additional linked trips may occur.



LEGEND:

⊖⊖⊖	TUOLUMNE MEADOWS CIRCULATOR AND TIOGA ROAD ACCESS SHUTTLE ROUTES
●●●●●●●	TUOLUMNE MEADOWS CIRCULATOR SHUTTLE ROUTE ONLY
●	TUOLUMNE MEADOWS CIRCULATOR SHUTTLE STOPS
▭▭▭	TIOGA ROAD ACCESS SHUTTLE ROUTE ONLY
▲	TIOGA ROAD ACCESS SHUTTLE STOPS

0 1500 3000 6000 FEET

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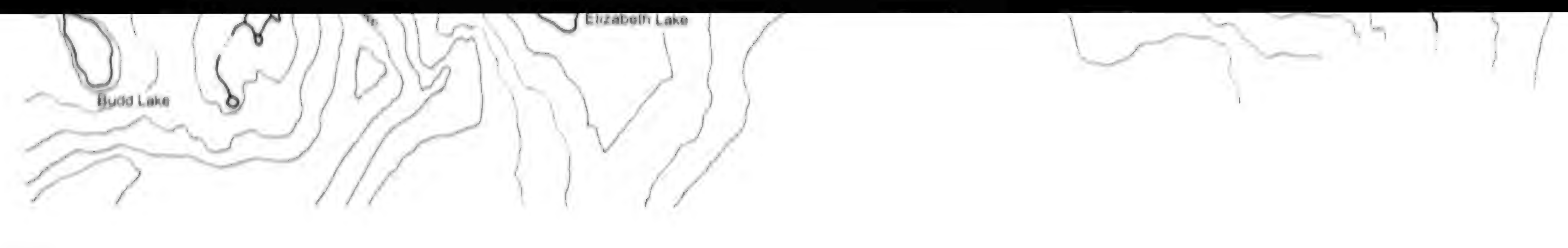

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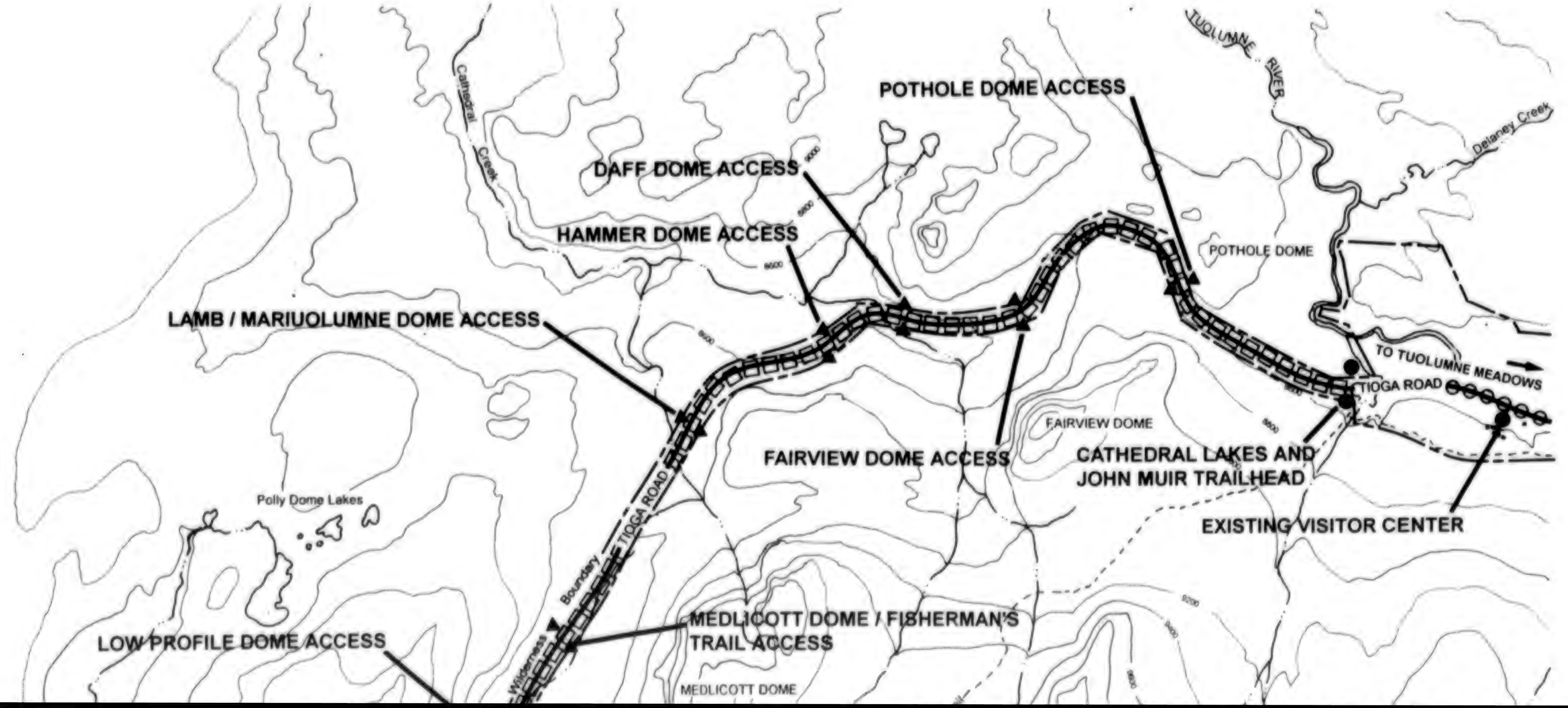
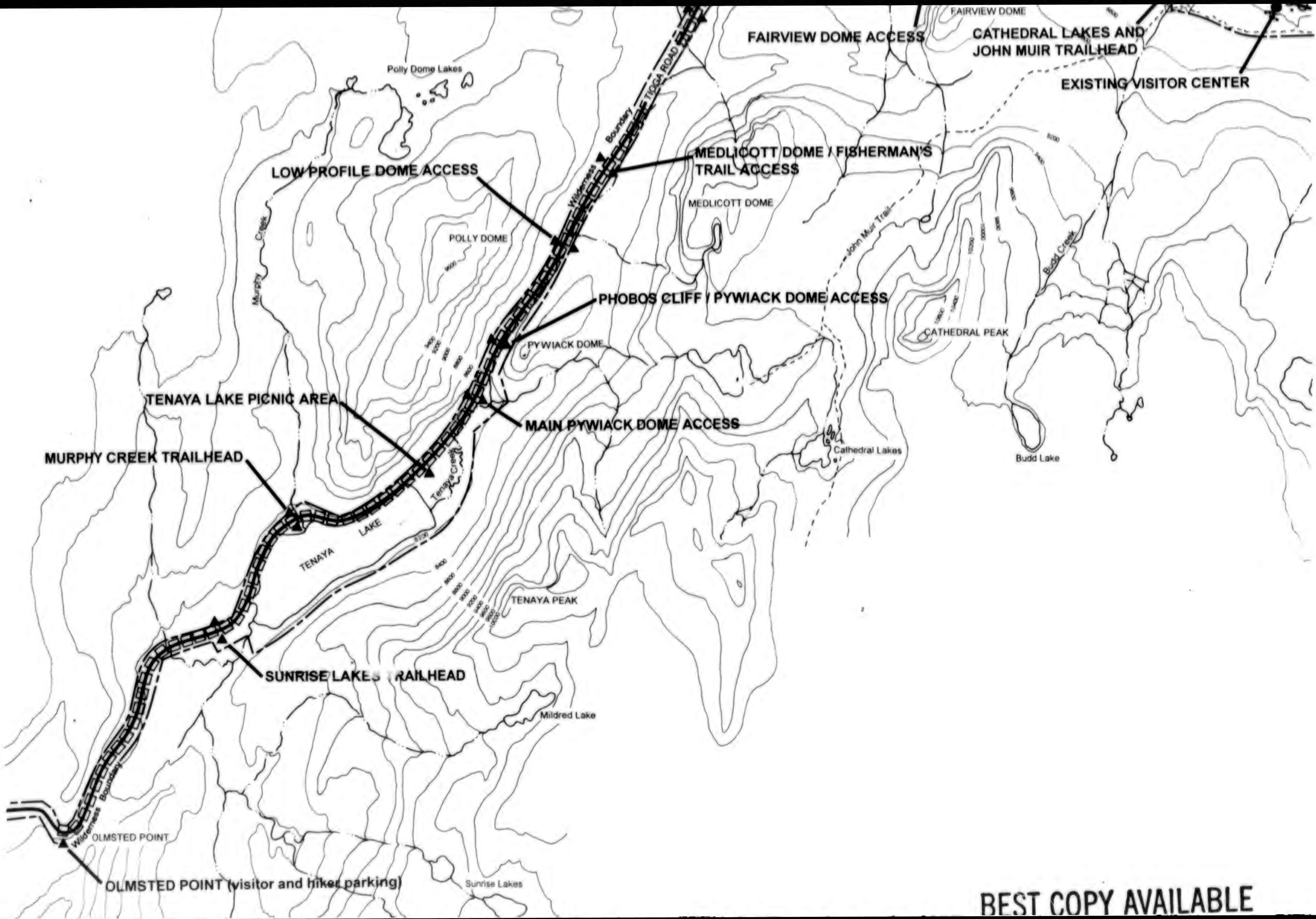
5

TIOGA ROAD ACCESS/ TUOLUMNE MEADOWS CIRCULATOR SHUTTLES ALTERNATIVE





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LEGEND:

- TIOGA ROAD ACCESS SHUTTLE ROUTE ONLY
- ▲ TIOGA ROAD ACCESS SHUTTLE STOPS
- TUOLUMNE MEADOWS CIRCULATOR AND TIOGA ROAD ACCESS SHUTTLE ROUTES
- ● TUOLUMNE MEADOWS CIRCULATOR SHUTTLE STOPS

0 1500 3000 6000 FEET

N

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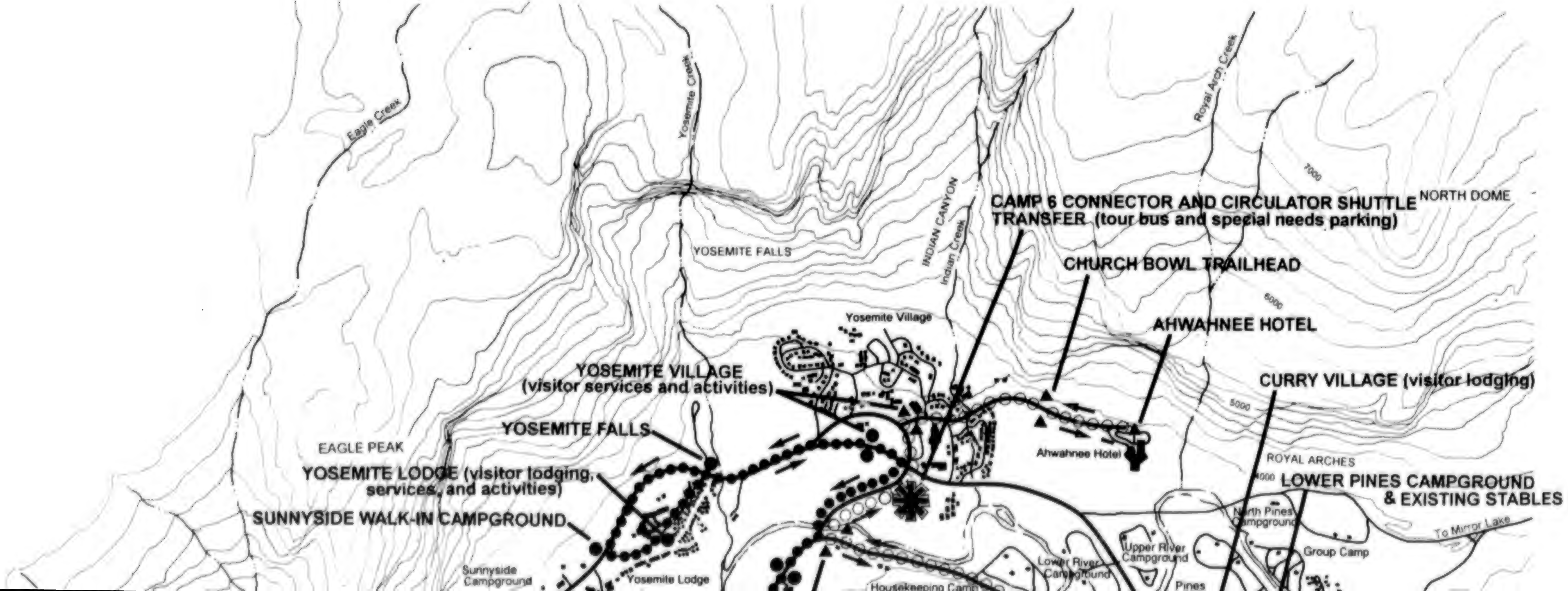
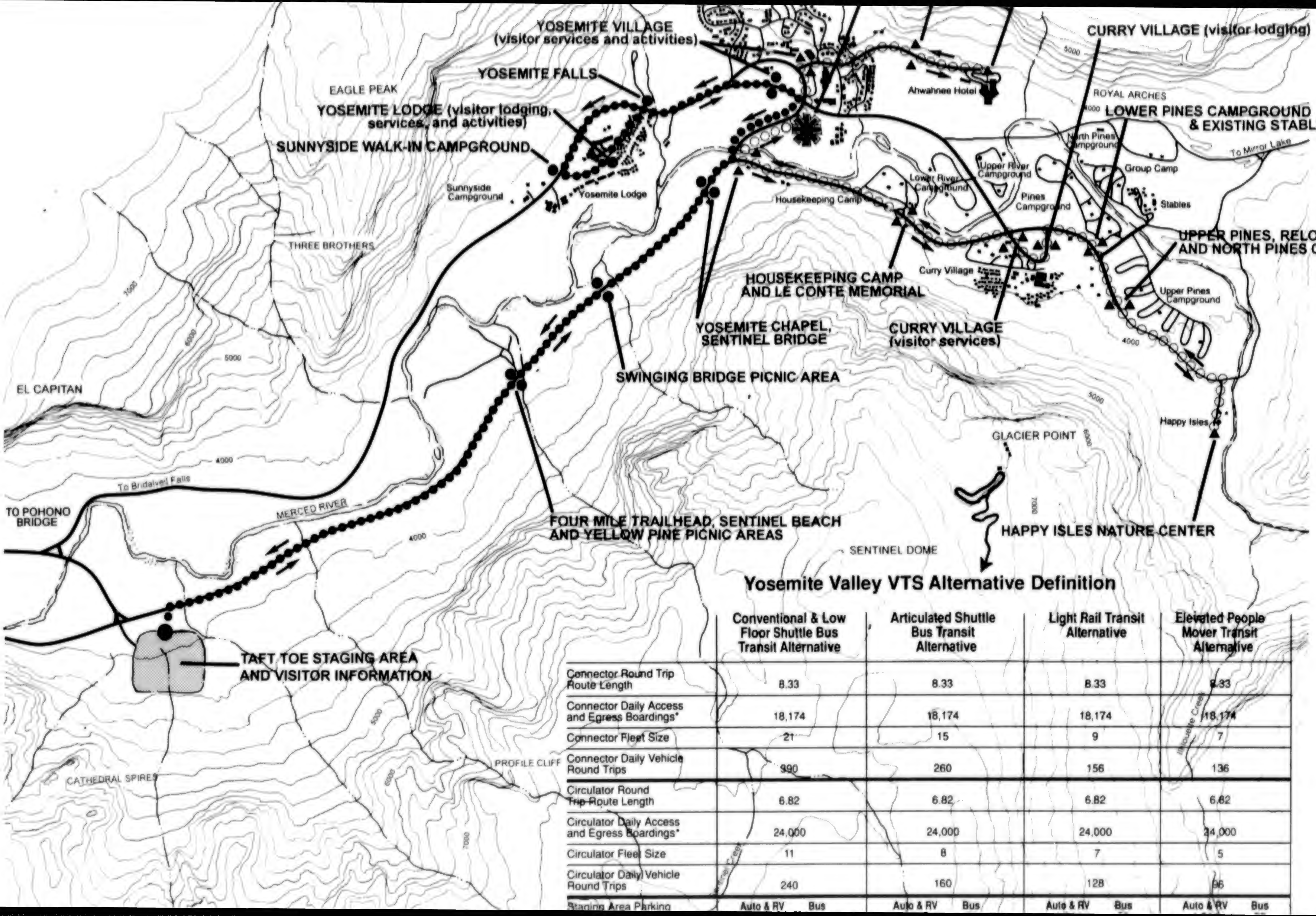
6

YOSEMITE VALLEY VTS ALTERNATIVE




YOSEMITE VILLAGE (visitor services and activities)
YOSEMITE FALLS
EAGLE PEAK
YOSEMITE LODGE (visitor lodging, services, and activities)
SUNNYSIDE WALK-IN CAMPGROUND
Sunnyside Campground
Yosemite Lodge
THREE BROTHERS
EL CAPITAN
To Bridalveil Falls
TO POHONO BRIDGE
MERCED RIVER
TAFT TOE STAGING AREA AND VISITOR INFORMATION
CATHEDRAL SPIRES
PROFILE CLIFF
FOUR MILE TRAILHEAD, SENTINEL BEACH AND YELLOW PINE PICNIC AREAS
SWINGING BRIDGE PICNIC AREA
YOSEMITE CHAPEL, SENTINEL BRIDGE
HOUSEKEEPING CAMP AND LE CONTE MEMORIAL
Housekeeping Camp
CURRY VILLAGE (visitor services)
Curry Village
CURRY VILLAGE (visitor lodging)
Ahwahnee Hotel
ROYAL ARCHES
LOWER PINES CAMPGROUND & EXISTING STABLES
North Pines Campground
Upper River Campground
Lower River Campground
Pines Campground
Group Camp
Stables
To Mirror Lake
UPPER PINES, RELOCATED RIVERSIDE, GROUP CAMP, AND NORTH PINES CAMPGROUNDS
Upper Pines Campground
Happy Isles
HAPPY ISLES NATURE CENTER
GLACIER POINT
SENTINEL DOME
Sentinel Creek
Illilouette Creek
4000
5000
6000
7000
LEGEND:
YOSEMITE VALLEY CONNECTOR SHUTTLE ROUTE
CONNECTOR SHUTTLE STOPS
YOSEMITE VALLEY CIRCULATOR SHUTTLE ROUTE
CIRCULATOR SHUTTLE STOPS
0
1000
2000
4000 FEET
N

NOTE: VTS Alternatives Include Bus, Light Rail, and Elevated People Mover Technologies.

Yosemite Valley VTS Alternative Definition

	Conventional & Low Floor Shuttle Bus Transit Alternative		Articulated Shuttle Bus Transit Alternative		Light Rail Transit Alternative		Elevated People Mover Transit Alternative	
Connector Round Trip Route Length	8.33		8.33		8.33		8.33	
Connector Daily Access and Egress Boardings*	18,174		18,174		18,174		18,174	
Connector Fleet Size	21		15		9		7	
Connector Daily Vehicle Round Trips	390		260		156		136	
Circulator Round Trip Route Length	6.82		6.82		6.82		6.82	
Circulator Daily Access and Egress Boardings*	24,000		24,000		24,000		24,000	
Circulator Fleet Size	11		8		7		5	
Circulator Daily Vehicle Round Trips	240		160		128		96	
Staging Area Parking	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus	Auto & RV	Bus

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Circulator Round Trip Route Length	6.82		6.82		6.82		6.82	
Circulator Daily Access and Egress Boardings*	24,000		24,000		24,000		24,000	
Circulator Fleet Size	11		8		7		5	
Circulator Daily Vehicle Round Trips	240		160		128		96	
Staging Area Parking Spaces Required	Auto & RV 1,844	Bus 20	Auto & RV 1,844	Bus 20	Auto & RV 1,844	Bus 20	Auto & RV 1,844	Bus 20

* Assumes two boardings per visitor. Additional linked trips may occur.

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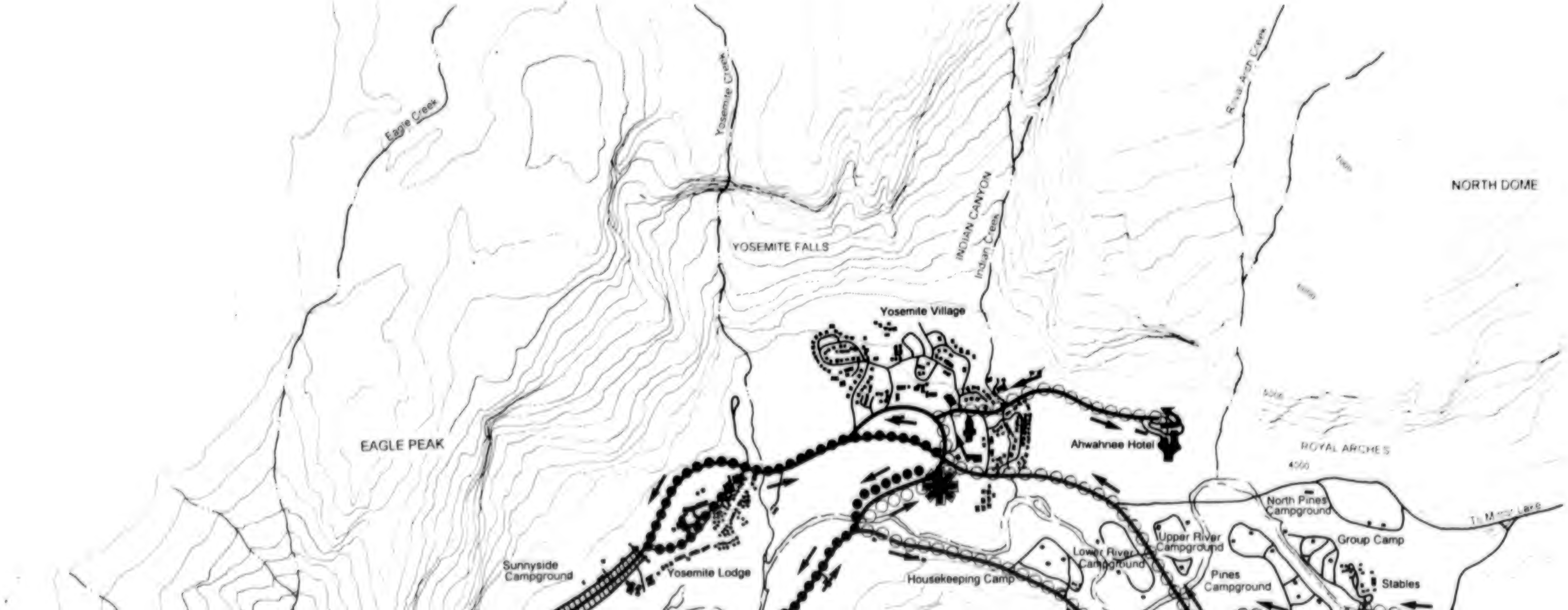
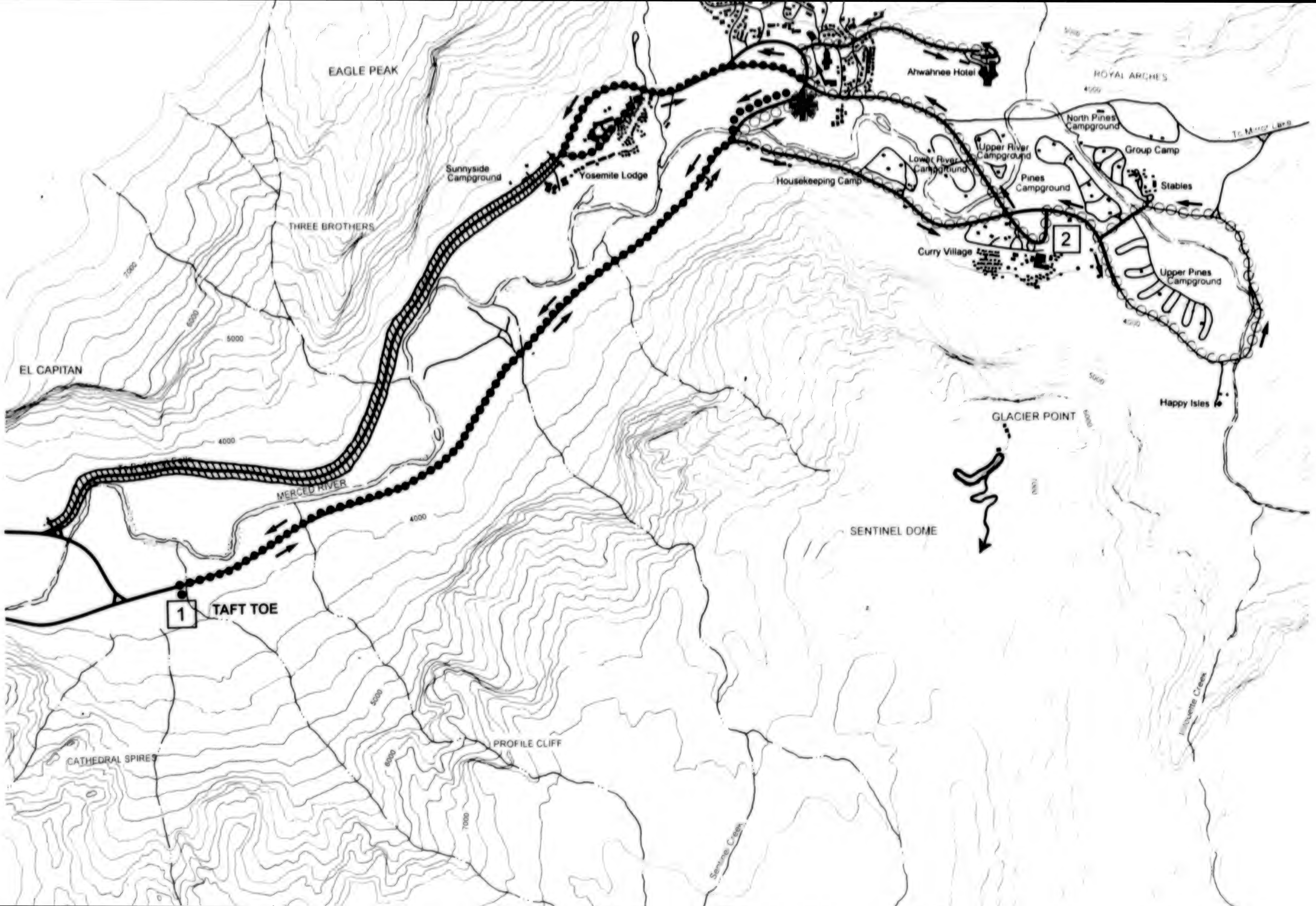


YOSEMITE VALLEY VTS-STAGE I

LEGEND:

ⵔⵔⵔⵔ VALLEY CIRCULATOR SHUTTLE



LEGEND:

- VALLEY CIRCULATOR SHUTTLE
- VALLEY CONNECTOR
- INTERMODAL TRANSFER AT CAMP 6.
- 1 DEVELOP TAFT TOE STAGING AREA, INCLUDING RELOCATION OF VISITOR CENTER.
- 2 RELOCATE MAIN STORE TO CURRY VILLAGE.
- ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE BETWEEN EL CAP CROSSOVER INTERSECTION AND YOSEMITE LODGE. MAINTAIN EMERGENCY ACCESS.

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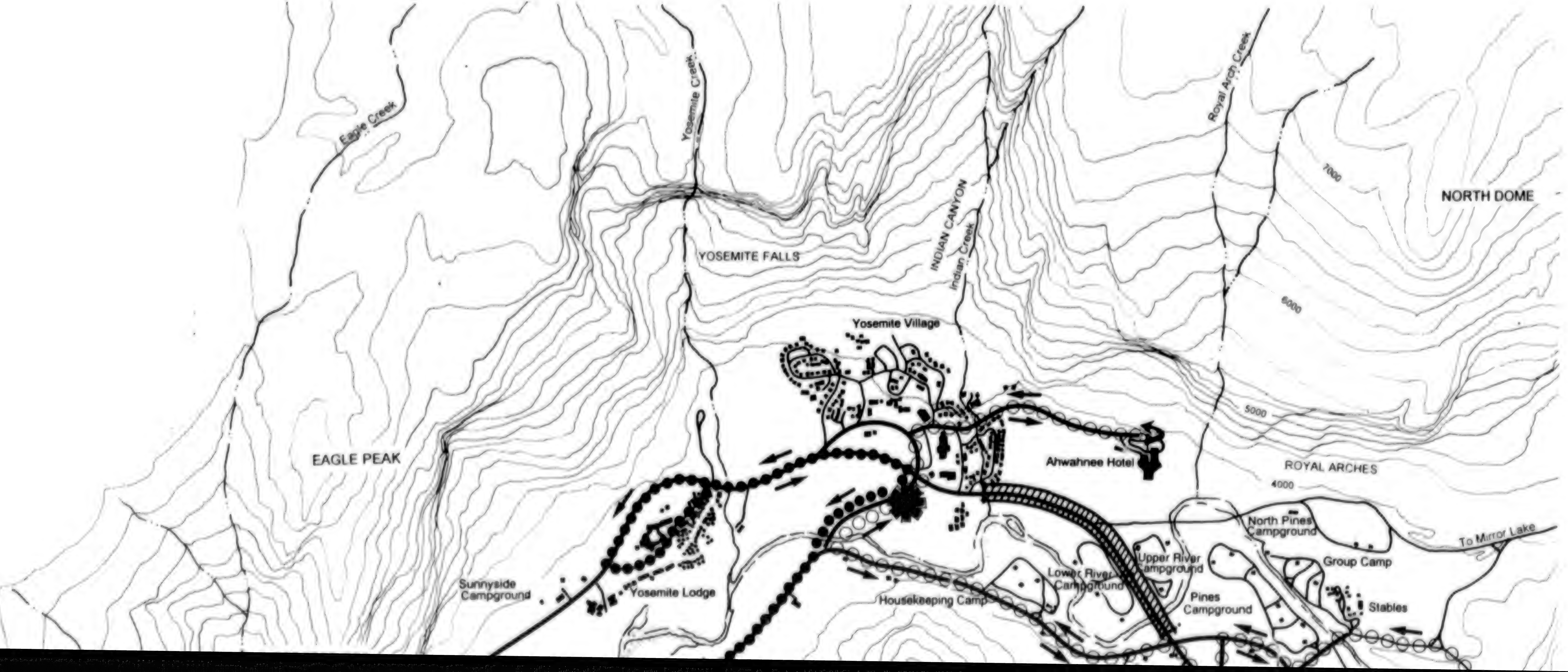
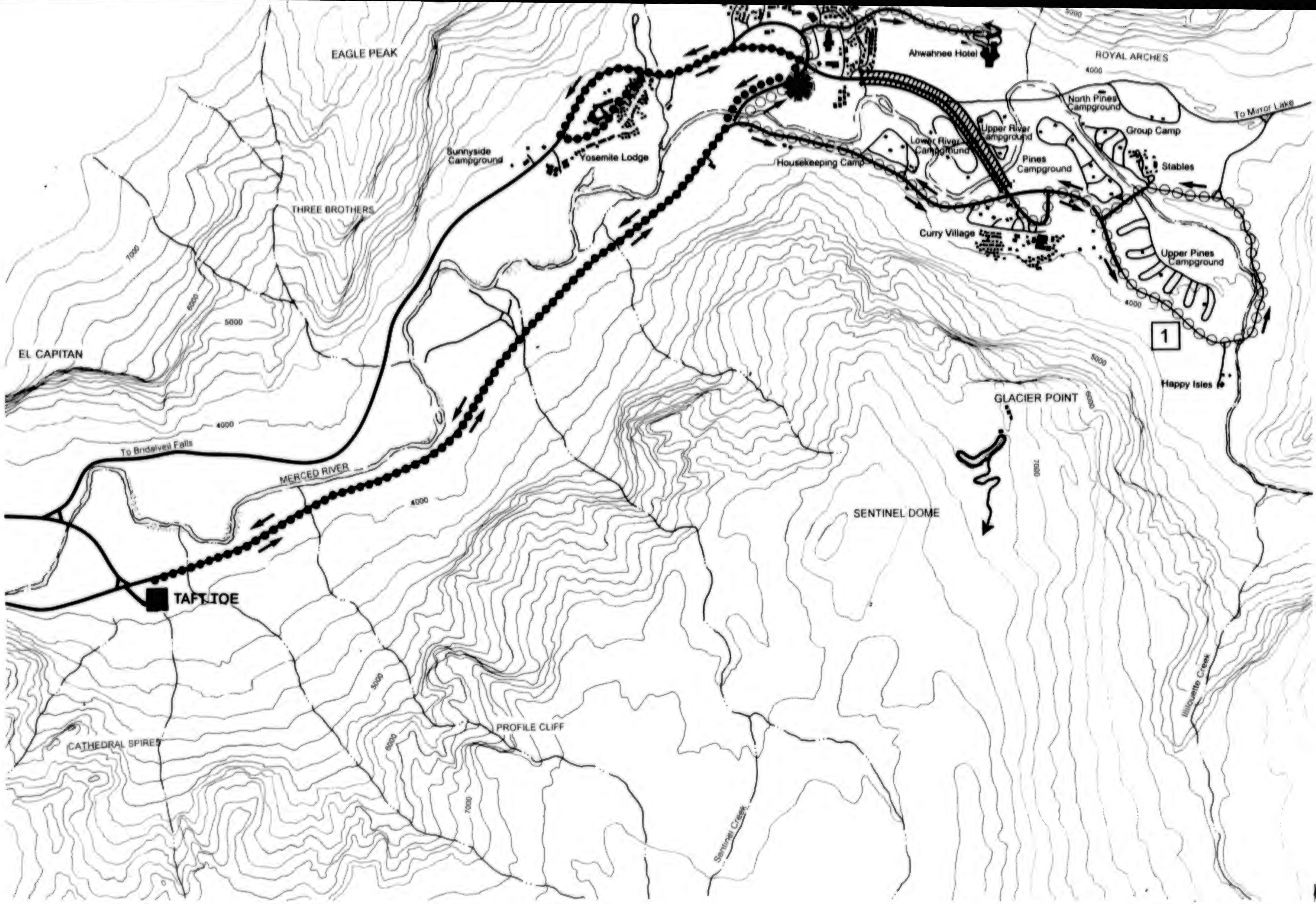
YOSEMITE VALLEY VTS-STAGE II





LEGEND:

- VALLEY CIRCULATOR SHUTTLE
- VALLEY CONNECTOR
- INTERMODAL TRANSFER AT CAMP 6.
- CLOSE STONEMAN BRIDGE ROAD TO VEHICULAR TRAFFIC.
- 1 RELOCATE UPPER AND LOWER RIVERSIDE CAMPS TO UPPER PINES CAMP AREA(WEST SIDE).

0 1000 2000 4000 FEET

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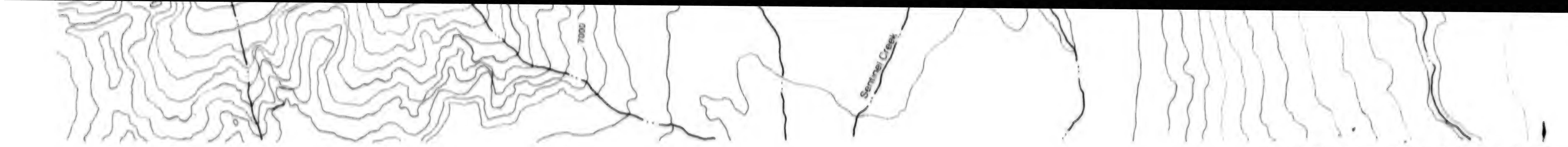

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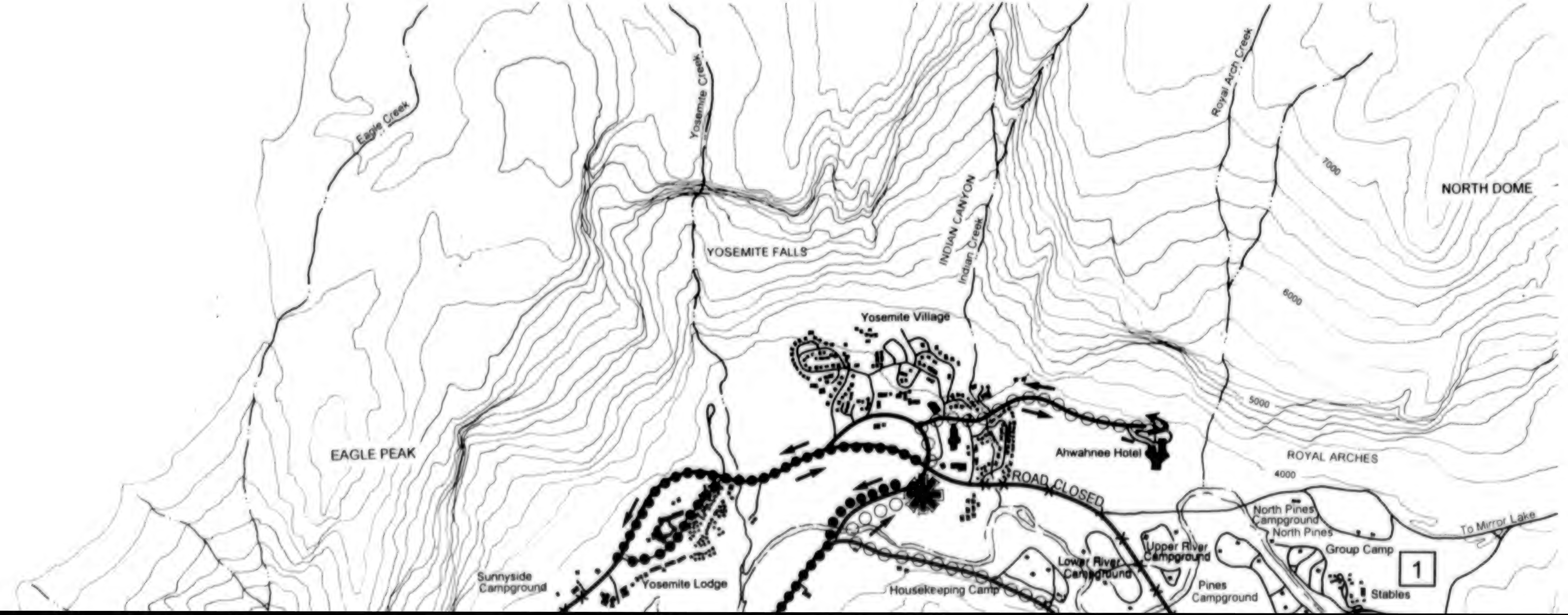

YOSEMITE VALLEY VTS-STAGE III

LEGEND:

⊖⊖⊖⊖⊖ VALLEY CIRCULATOR SHUTTLE

●●●●● VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT

— — — OPTIONAL VALLEY CONNECTOR ALIGNMENT

✱ INTERMODAL TRANSFER AT CAMP 6.

▨ ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE BETWEEN POHONO BRIDGE TO EL CAP

VALLEY CIRCULATOR SHUTTLE
VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT
OPTIONAL VALLEY CONNECTOR ALIGNMENT
INTERMODAL TRANSFER AT CAMP 6.
ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE BETWEEN POHONO BRIDGE TO EL CAP CROSSOVER. PROVIDE EL CAPITAN VIEWING AND CLIMBER PARKING ACCESS.
WIDEN SOUTHSIDE DRIVE AS MAJOR ACCESS TO VALLEY FROM WEST BETWEEN POHONO BRIDGE CROSSING AND TAFT TOE STAGING AREA.
1 RELOCATE STABLES.
2 RELOCATE NORTH PINES AND GROUP CAMPS TO UPPER PINES CAMP AREA.
ELIMINATE SHUTTLE CIRCULATION NORTHEAST OF NATURE CENTER AND ON HAPPY ISLES AND CLARKS BRIDGES.
0
1000
2000
4000 FEET
N
EAGLE PEAK
Ahwahnee Hotel
ROYAL ARCHES
ROAD CLOSED
North Pines Campground
North Pines
Group Camp
To Mirror Lake
1
Stables
Upper River Campground
Lower River Campground
Pines Campground
Housekeeping Camp
Sunnyside Campground
Yosemite Lodge
THREE BROTHERS
Curry Village
Upper Pines Campground
2
Happy Isles
GLACIER POINT
EL CAPITAN
ROAD CLOSED
To Bridalveil Falls
MERCED RIVER
El Cap Parking
TO POHONO BRIDGE
TAFT TOE
SENTINEL DOME
PROFILE CLIFF
CATHEDRAL SPIRES
Sentinel Creek
Illilouette Creek
7000
6000
5000
4000

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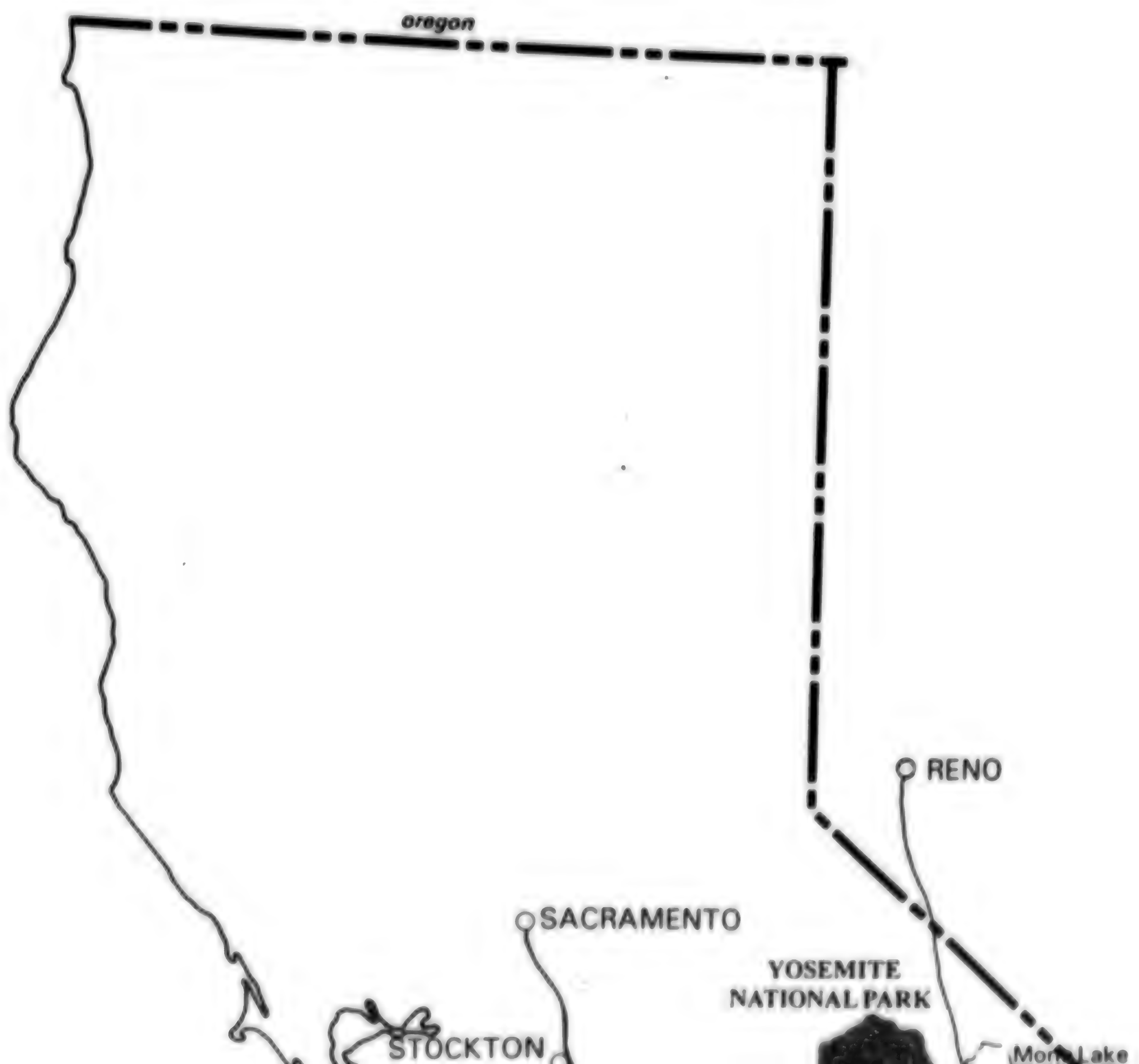
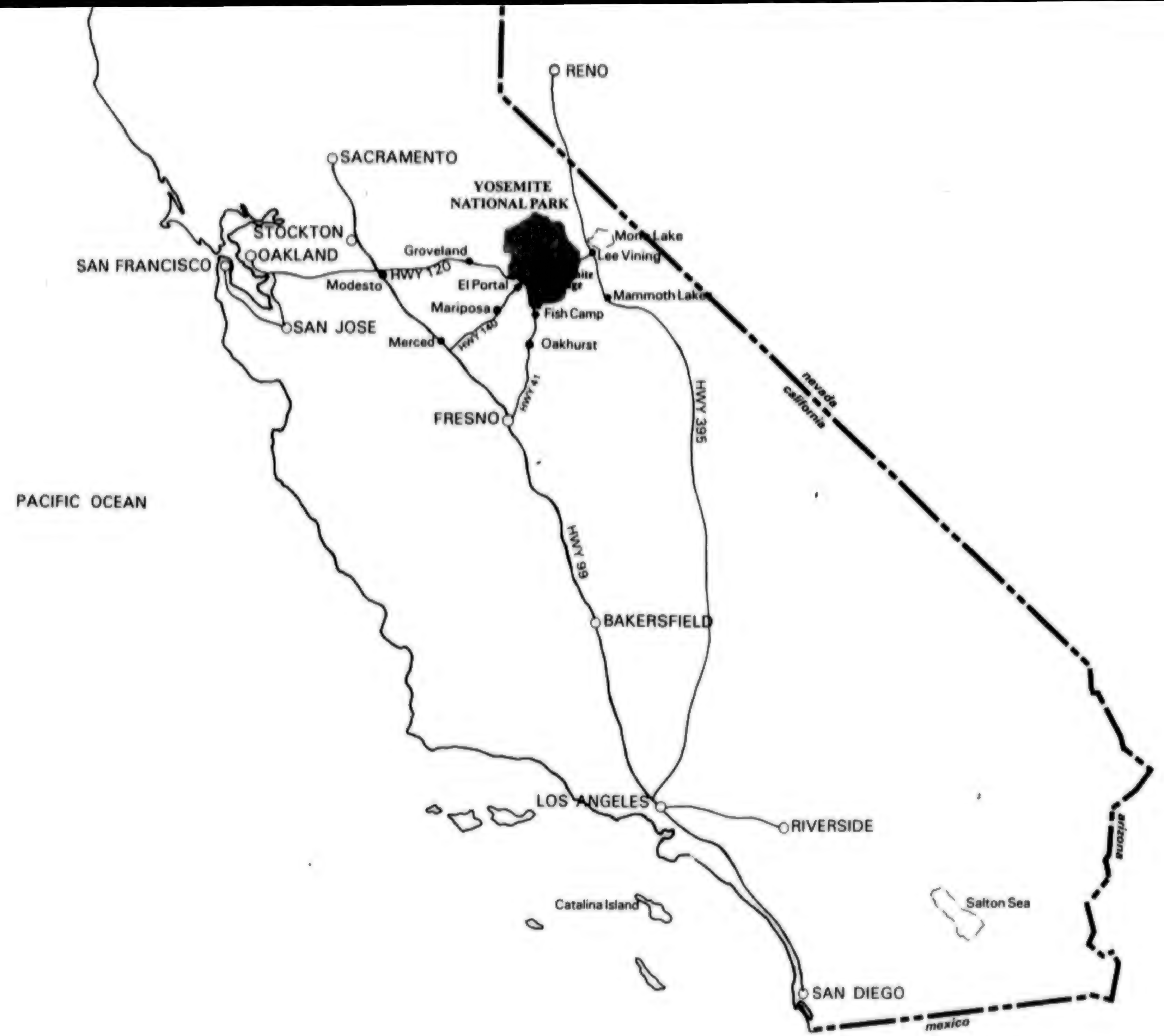
10

VICINITY MAP





0 20 40 100 MILES

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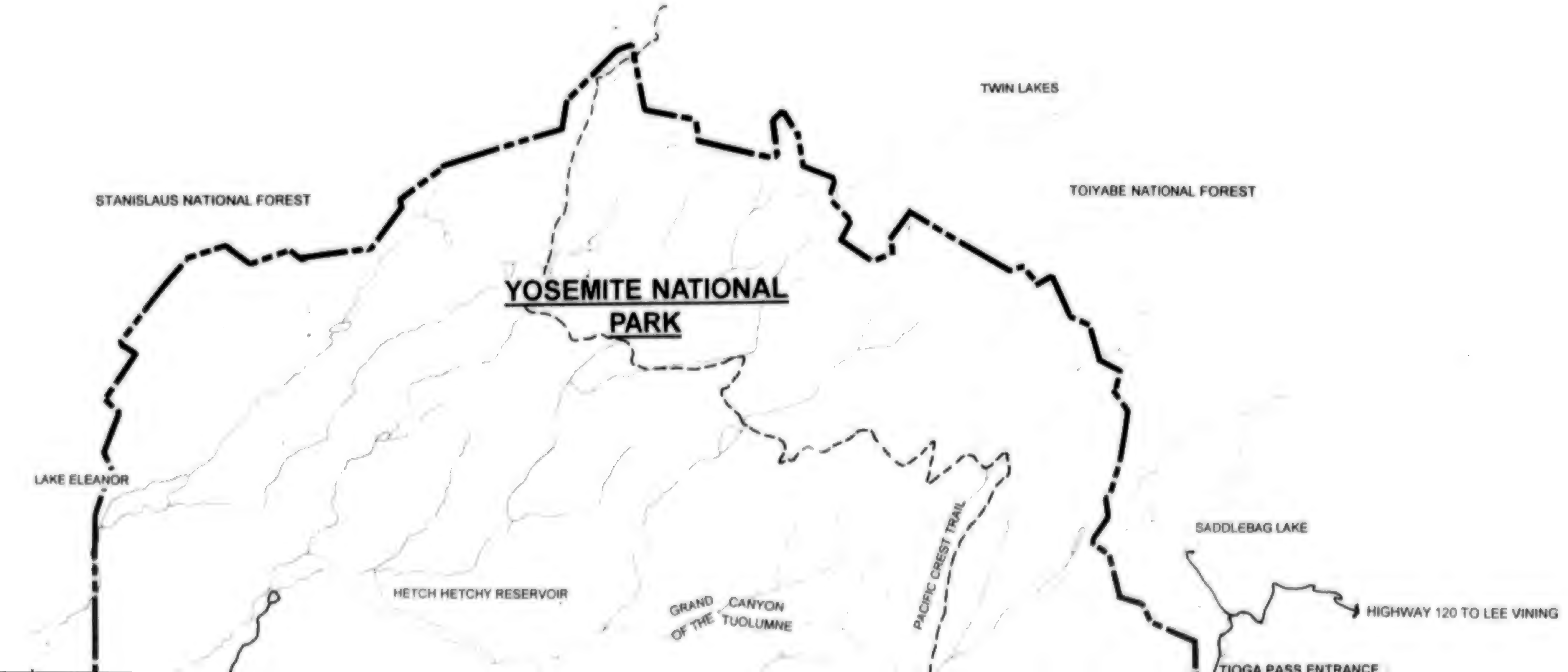
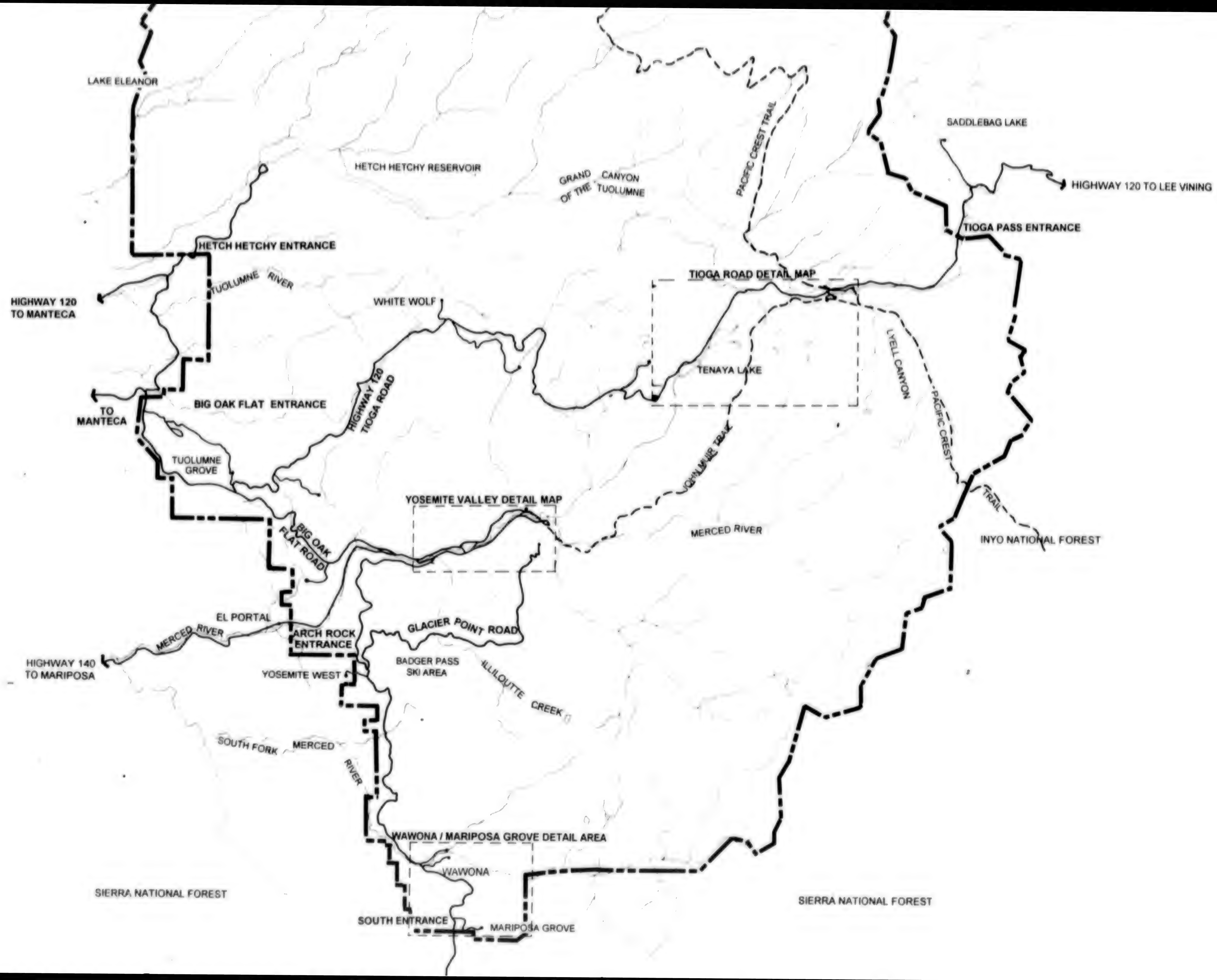
PARK OVERVIEW





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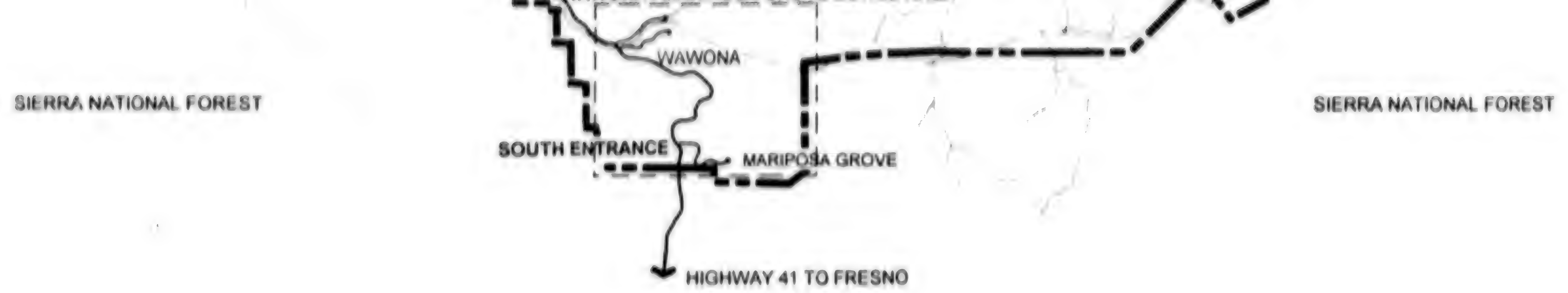

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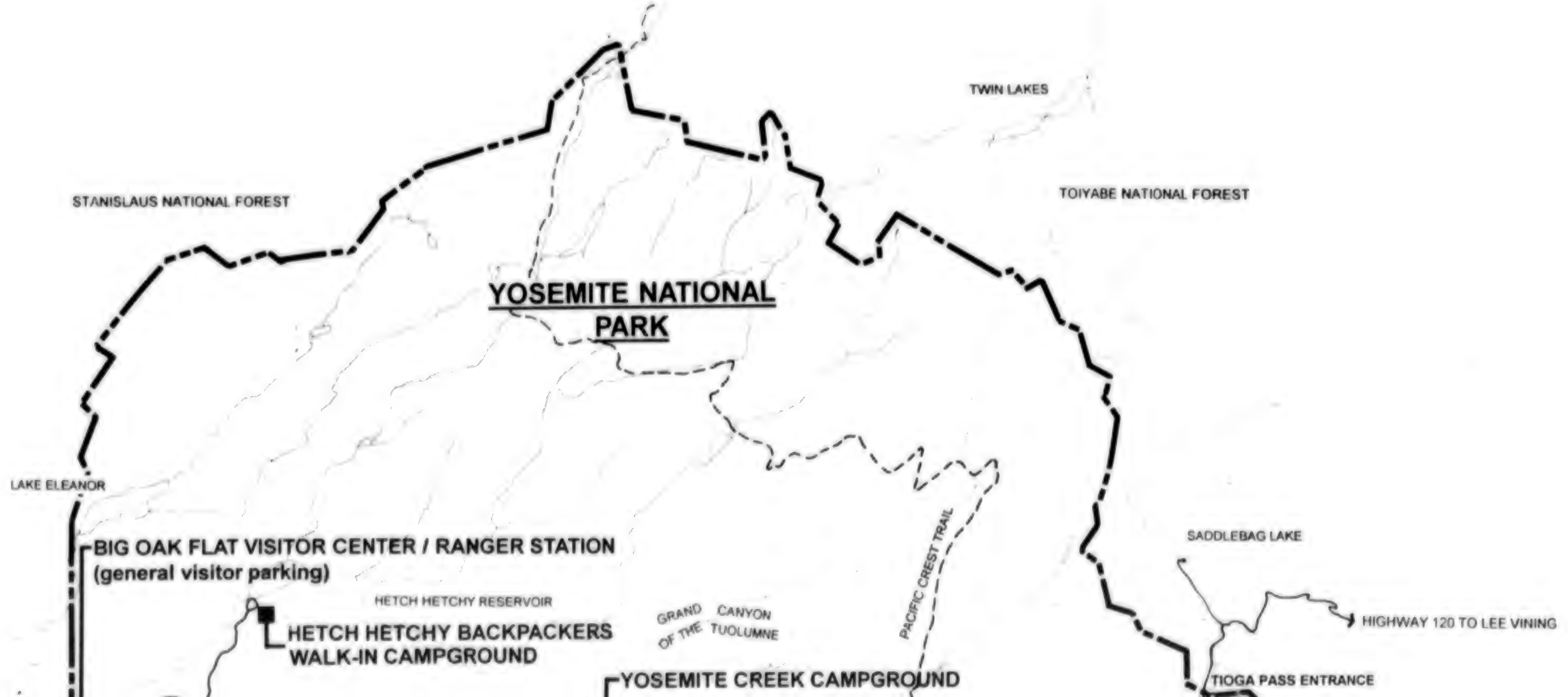
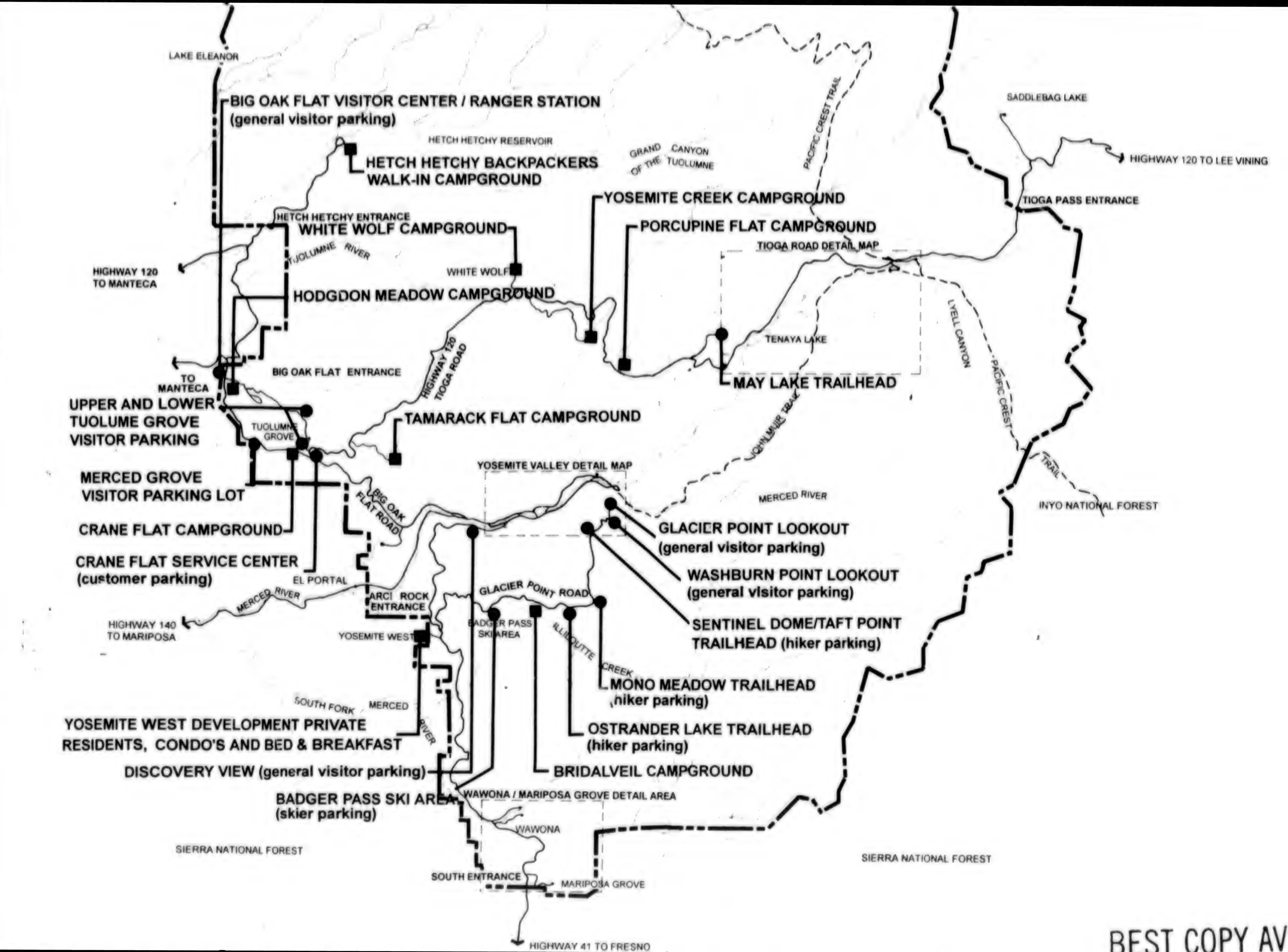
12

VISITOR FACILITIES OUTSIDE OF MAJOR ACTIVITY AREAS




LAKE ELEANOR
BIG OAK FLAT VISITOR CENTER / RANGER STATION (general visitor parking)
HETCH HETCHY RESERVOIR
HETCH HETCHY BACKPACKERS WALK-IN CAMPGROUND
GRAND CANYON OF THE TUOLUMNE
PACIFIC CREST TRAIL
SADDLEBAG LAKE
HIGHWAY 120 TO LEE VINING
TIOGA PASS ENTRANCE
YOSEMITE CREEK CAMPGROUND
PORCUPINE FLAT CAMPGROUND
TIOGA ROAD DETAIL MAP
HETCH HETCHY ENTRANCE
WHITE WOLF CAMPGROUND
TUOLUMNE RIVER
HIGHWAY 120 TO MANTECA
WHITE WOLF
HODGDON MEADOW CAMPGROUND
HIGHWAY 120 TIOGA ROAD
TENAYA LAKE
LYELL CANYON
TO MANTECA
BIG OAK FLAT ENTRANCE
MAY LAKE TRAILHEAD
UPPER AND LOWER TUOLUME GROVE VISITOR PARKING
TUOLUMNE GROVE
TAMARACK FLAT CAMPGROUND
JOHN MUIR TRAIL
PACIFIC CREST TRAIL
MERCED GROVE VISITOR PARKING LOT
YOSEMITE VALLEY DETAIL MAP
MERCED RIVER
INYO NATIONAL FOREST
BIG OAK FLAT ROAD
CRANE FLAT CAMPGROUND
GLACIER POINT LOOKOUT (general visitor parking)
CRANE FLAT SERVICE CENTER (customer parking)
WASHBURN POINT LOOKOUT (general visitor parking)
EL PORTAL
GLACIER POINT ROAD
ARCH ROCK ENTRANCE
HIGHWAY 140 TO MARIPOSA
MERCED RIVER
SENTINEL DOME/TAFT POINT TRAILHEAD (hiker parking)
YOSEMITE WEST
BADGER PASS SKI AREA
ILLILOUETTE CREEK
MONO MEADOW TRAILHEAD (hiker parking)
SOUTH FORK MERCED RIVER
YOSEMITE WEST DEVELOPMENT PRIVATE RESIDENTS, CONDO'S AND BED & BREAKFAST
OSTRANDER LAKE TRAILHEAD (hiker parking)
DISCOVERY VIEW (general visitor parking)
BRIDALVEIL CAMPGROUND
BADGER PASS SKI AREA (skier parking)
WAWONA / MARIPOSA GROVE DETAIL AREA
WAWONA
SIERRA NATIONAL FOREST
SIERRA NATIONAL FOREST
SOUTH ENTRANCE
MARIPOSA GROVE
HIGHWAY 41 TO FRESNO
0 1 5 10 MILES
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LEGEND:

- ● PARKING AREAS AND TRAILHEADS
- ■ OVERNIGHT ACCOMMODATIONS

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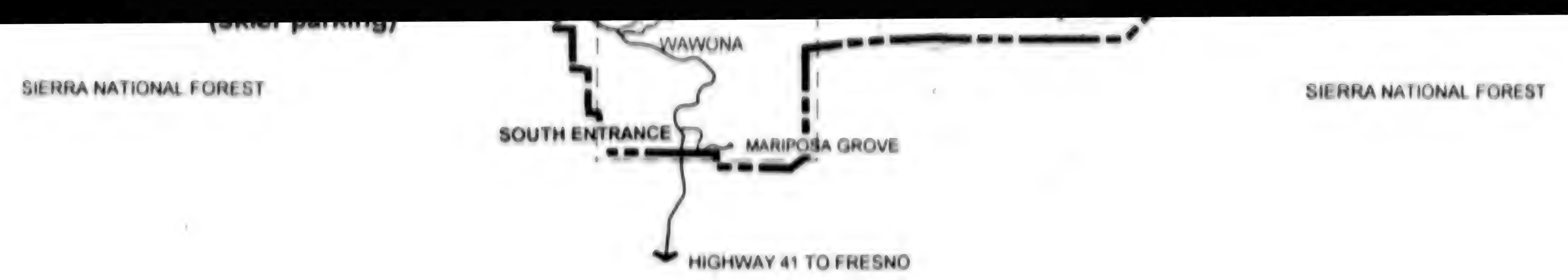

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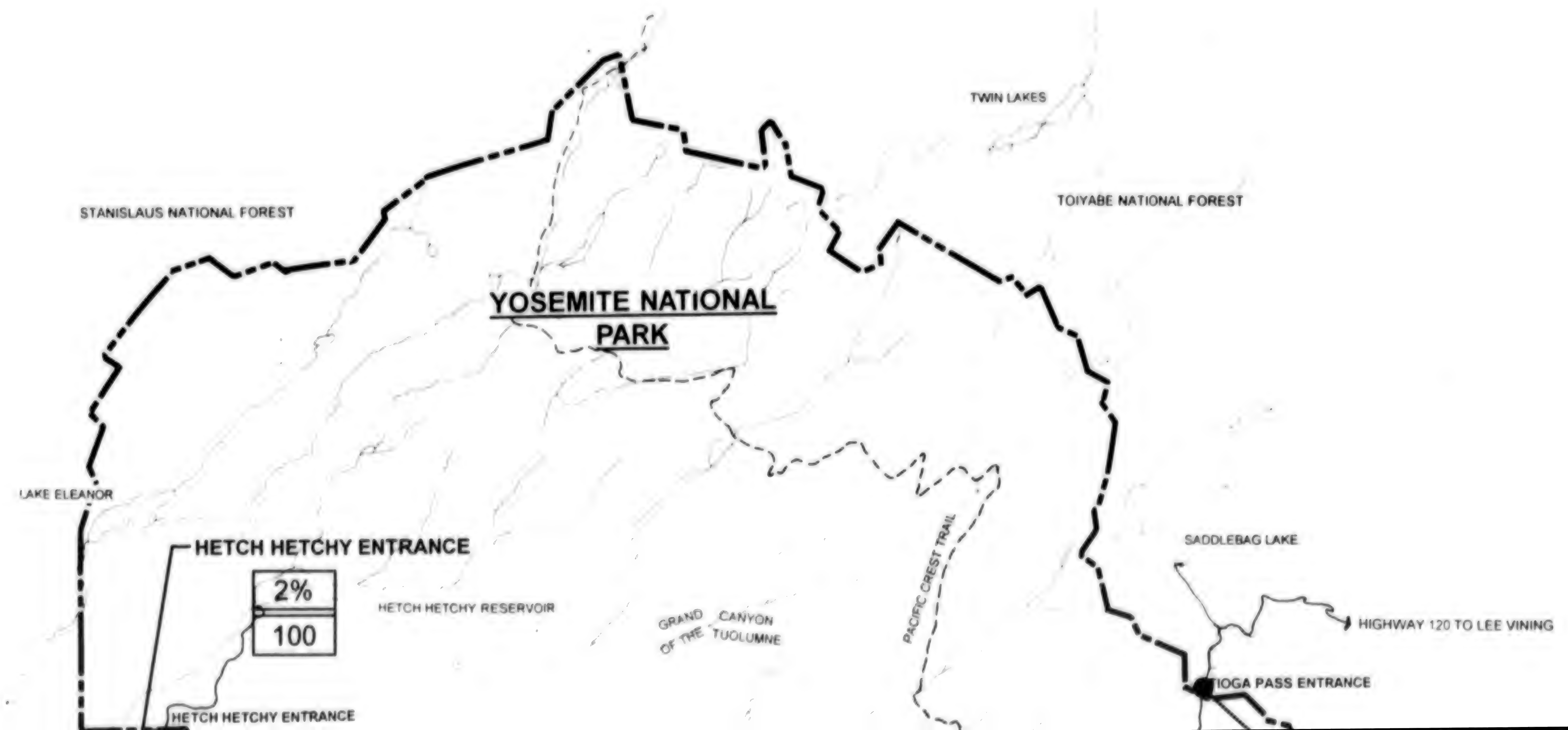
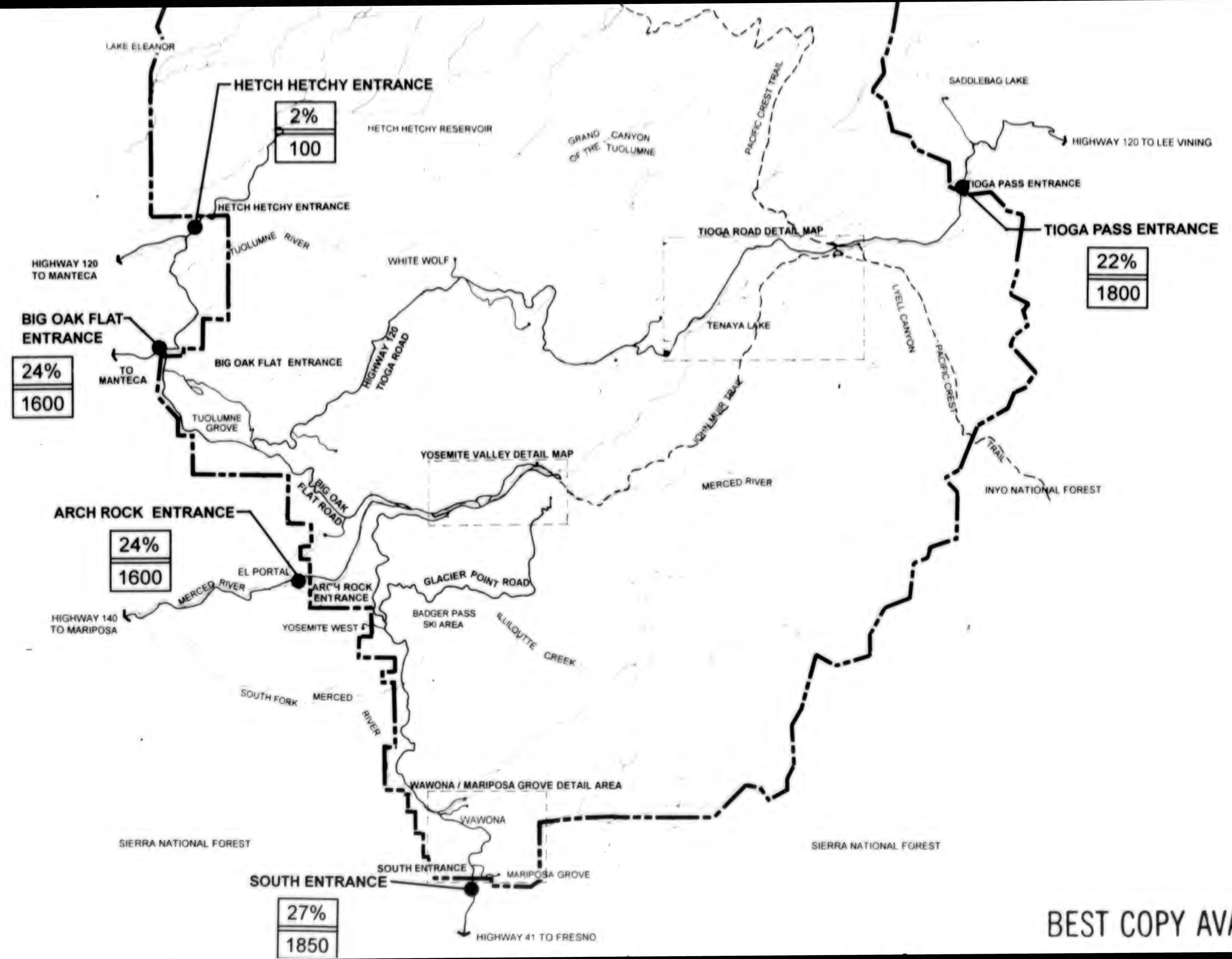
NATIONAL PARK SERVICE DSC/SEPT 93/104 20109

PROPORTIONS OF PEAK SEASON VEHICLE ENTRIES





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LEGEND:

10%	**1992 PEAK SEASON PERCENTAGES (MAY - SEPTEMBER)**
1000	**1992 AVERAGE DAILY VEHICLE ENTRIES FOR AUGUST**

SOURCE: MONTHLY PUBLIC USE REPORTS

0 1 5 10 MILES

N

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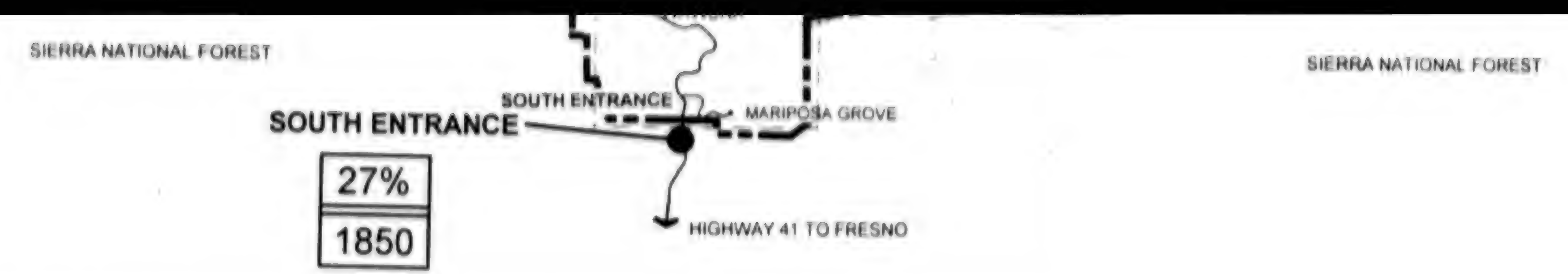
ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC/SEPT 93/184 20111



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ALTERNATIVE TRANSPORTATION
MODES FEASIBILITY STUDY

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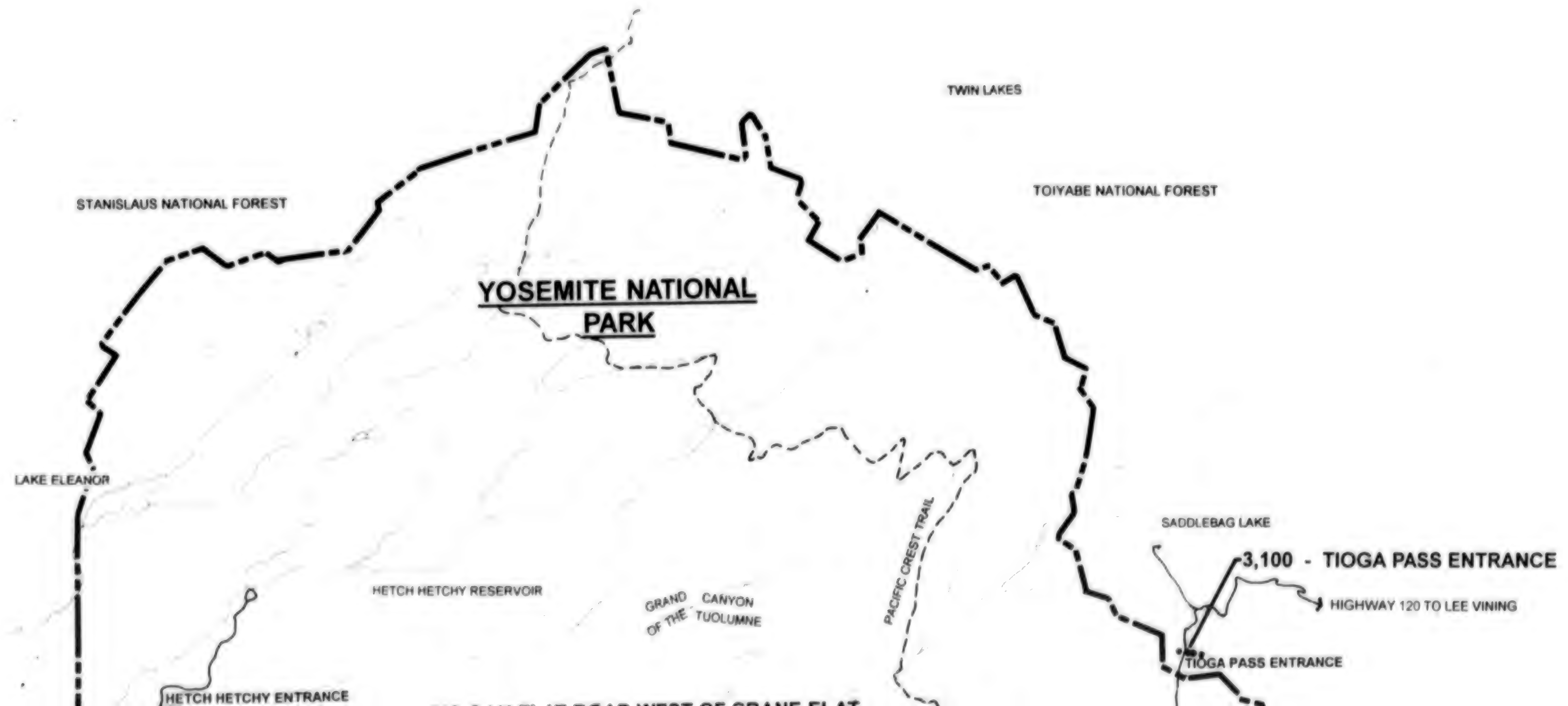
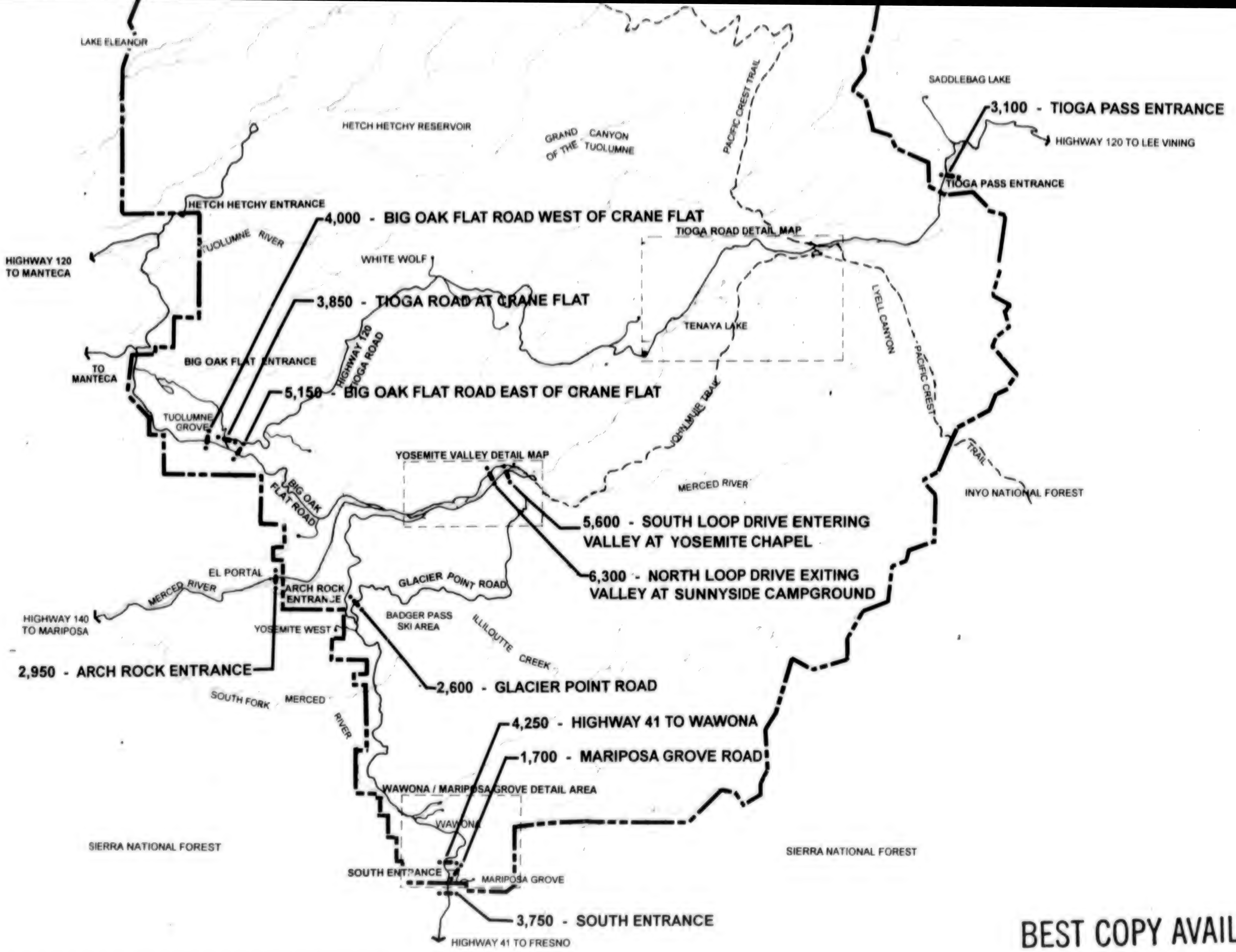
NATIONAL PARK SERVICE DSC/SEPT 93/184 20111

jH

1991 AVERAGE DAILY TWO-WAY TRAFFIC FOR JULY





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LEGEND:

●▬● 1991 AVERAGE DAILY TWO-WAY TRAFFIC FOR JULY

0 1 5 10 MILES

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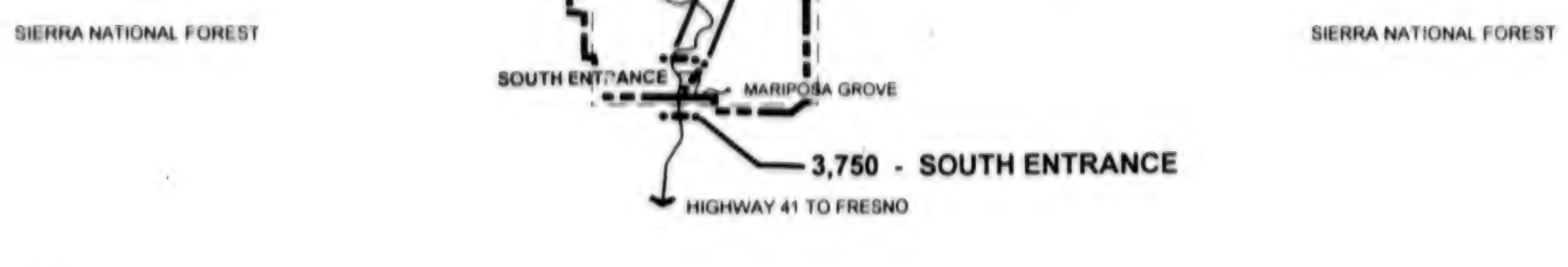

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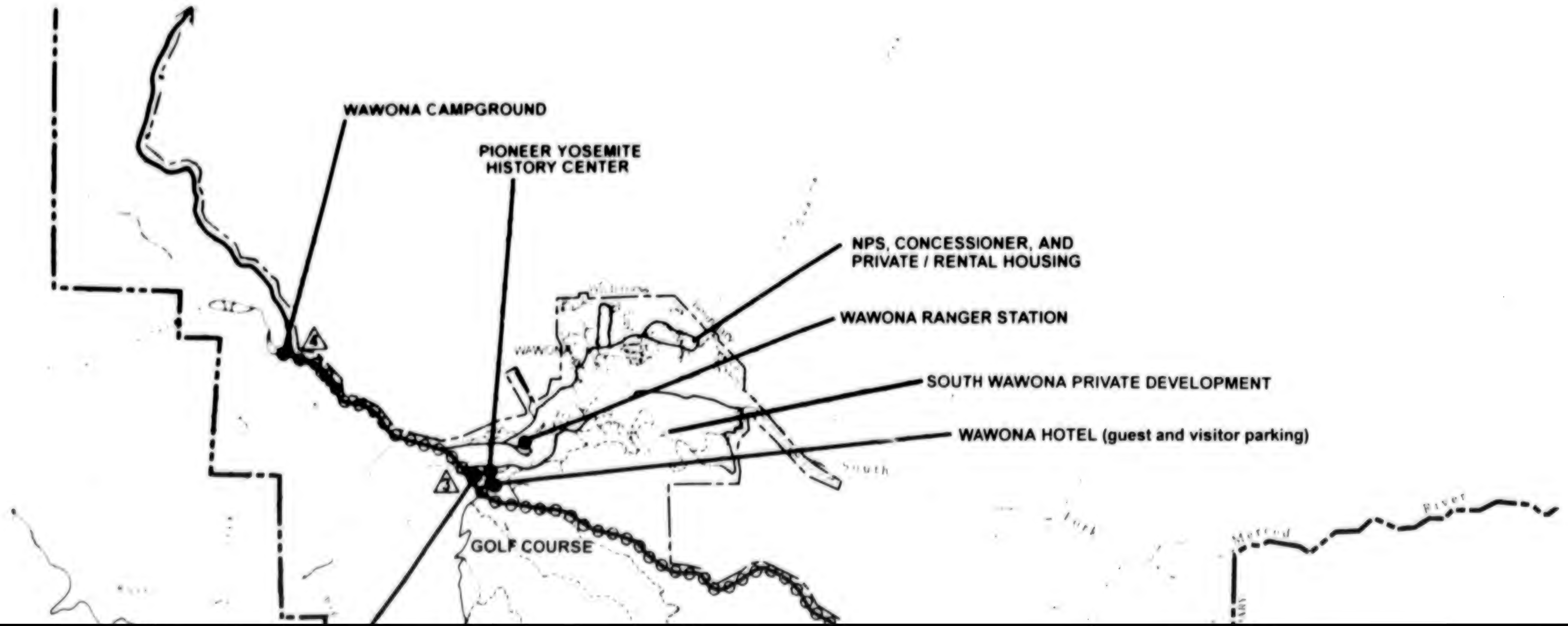
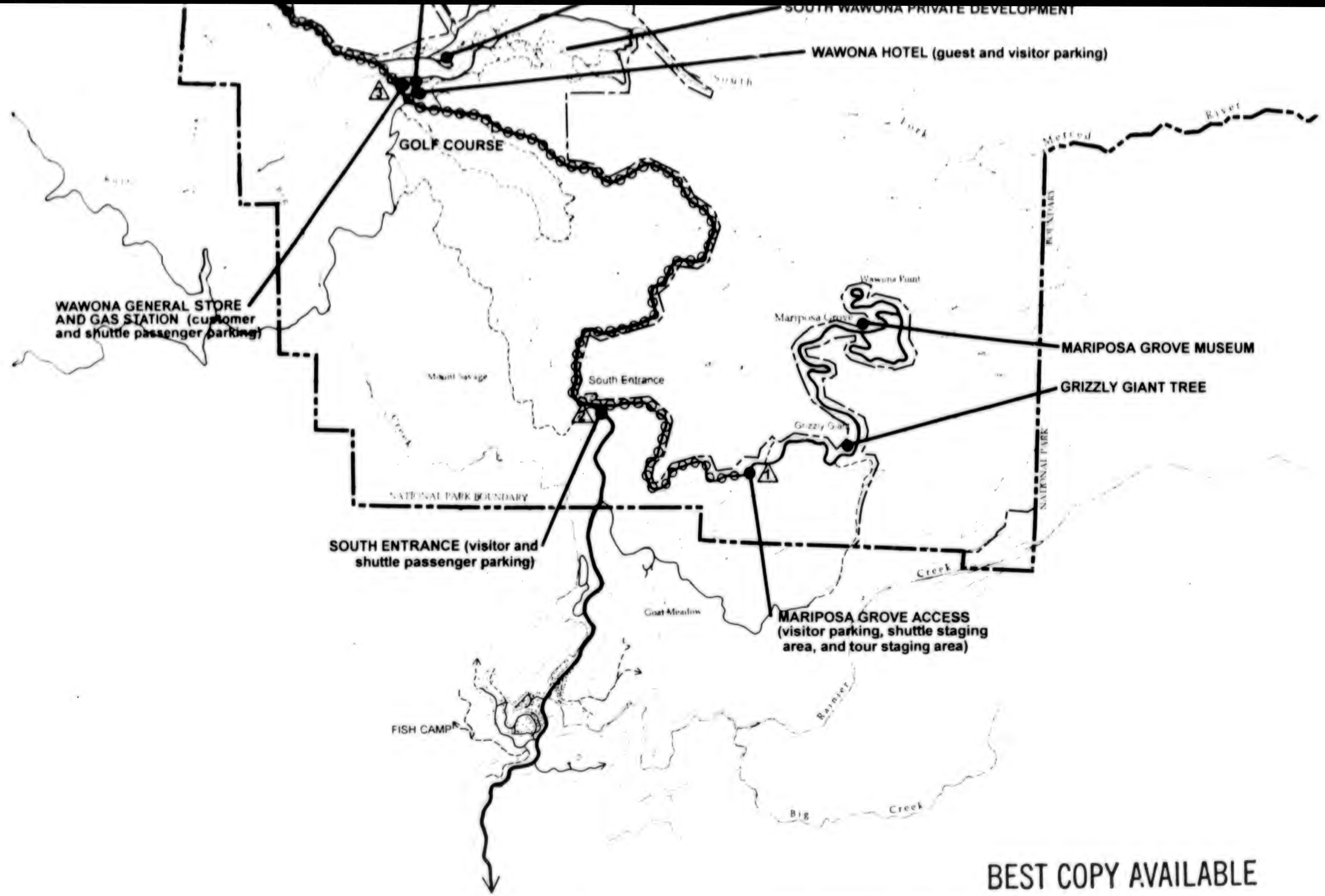
15

WAWONA/MARIPOSA GROVE AREA DETAIL


WAWONA CAMPGROUND
PIONEER YOSEMITE HISTORY CENTER
NPS, CONCESSIONER, AND PRIVATE / RENTAL HOUSING
WAWONA RANGER STATION
SOUTH WAWONA PRIVATE DEVELOPMENT
WAWONA HOTEL (guest and visitor parking)
GOLF COURSE
4
3
WAWONA
South Fork
Merced River


SOUTH WAWONA PRIVATE DEVELOPMENT
WAWONA HOTEL (guest and visitor parking)
South
Fork
Merced
River
GOLF COURSE
3
WAWONA GENERAL STORE AND GAS STATION (customer and shuttle passenger parking)
Mount Savage
South Entrance
2
NATIONAL PARK BOUNDARY
BOUNDARY
NATIONAL PARK
Wawona Point
Mariposa Grove
MARIPOSA GROVE MUSEUM
GRIZZLY GIANT TREE
Grizzly Giant
1
SOUTH ENTRANCE (visitor and shuttle passenger parking)
Goat Meadow
MARIPOSA GROVE ACCESS (visitor parking, shuttle staging area, and tour staging area)
Creek
Rainier
FISH CAMP
Big
Creek

LEGEND:

WAWONA / MARIPOSA GROVE SHUTTLE ROUTE

SHUTTLE BUS STOP LOCATIONS

- △1 MARIPOSA GROVE SHUTTLE STOP AND STAGING AREA
- △2 SOUTH ENTRANCE
- △3 WAWONA GENERAL STORE
- △4 WAWONA CAMPGROUND

0 1/4 1/2 1 MILE

N

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UNITED STATES DEPARTMENT OF THE INTERIOR
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ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

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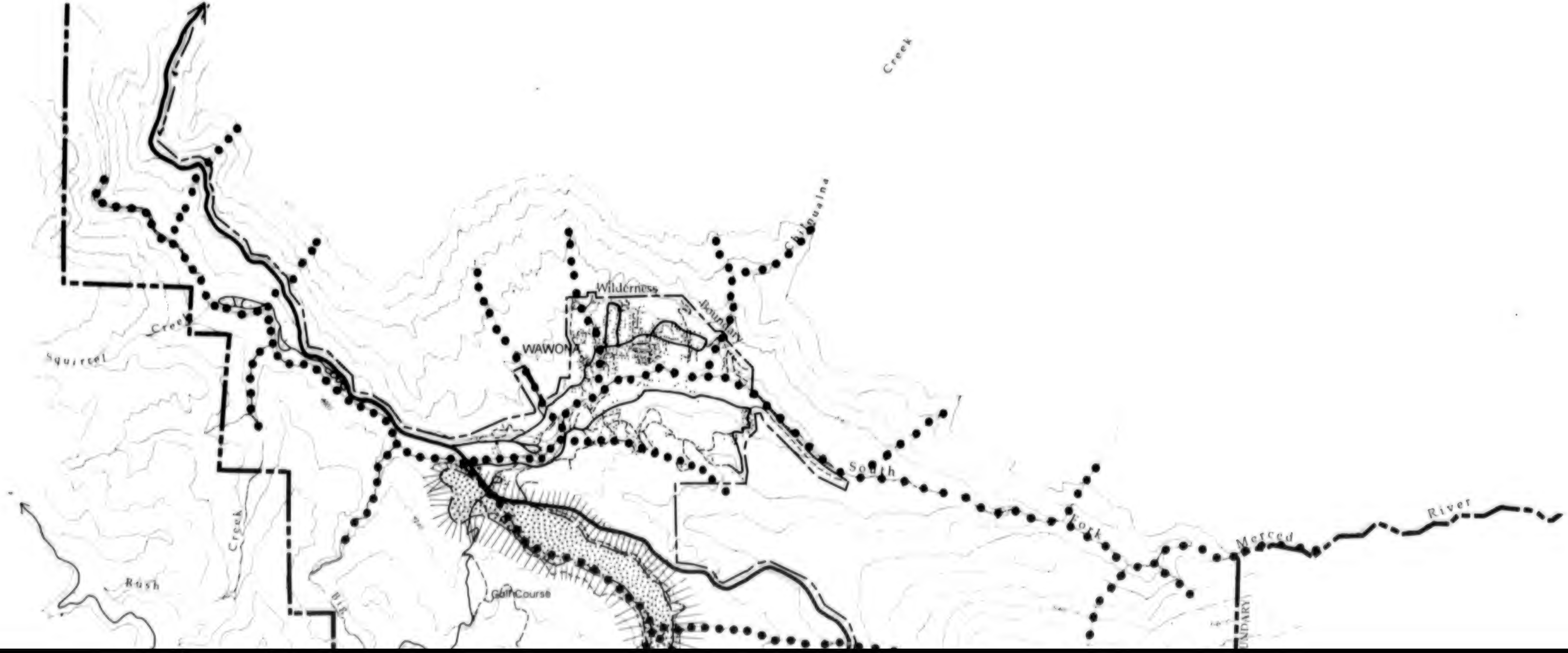
NATIONAL PARK SERVICE DSC/SEPT 93/104 20112

16

WAWONA / MARIPOSA GROVE HABITAT CONCERNS



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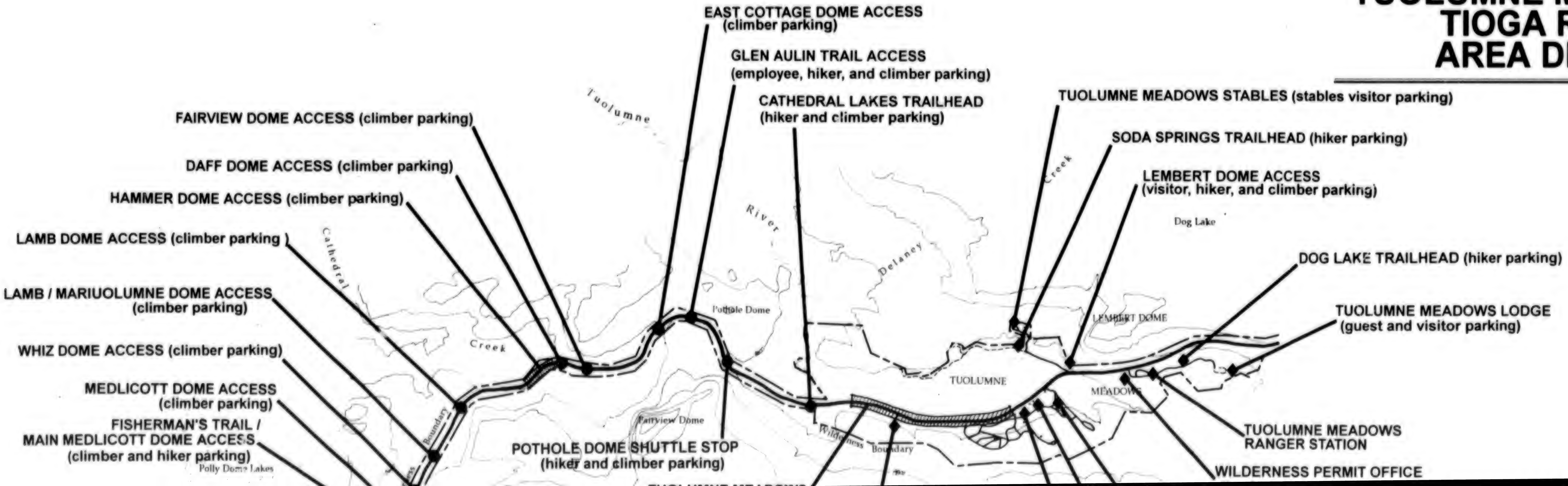
TUOLUMNE MEADOWS/ TIOGA ROAD AREA DETAIL


EAST COTTAGE DOME ACCESS (climber parking)
GLEN AULIN TRAIL ACCESS (employee, hiker, and climber parking)
CATHEDRAL LAKES TRAILHEAD (hiker and climber parking)
TUOLUMNE MEADOWS STABLES (stables visitor parking)
SODA SPRINGS TRAILHEAD (hiker parking)
LEMBERT DOME ACCESS (visitor, hiker, and climber parking)
DOG LAKE TRAILHEAD (hiker parking)
TUOLUMNE MEADOWS LODGE (guest and visitor parking)
FAIRVIEW DOME ACCESS (climber parking)
DAFF DOME ACCESS (climber parking)
HAMMER DOME ACCESS (climber parking)
LAMB DOME ACCESS (climber parking)
LAMB / MARIUOLUMNE DOME ACCESS (climber parking)
WHIZ DOME ACCESS (climber parking)
MEDLICOTT DOME ACCESS (climber parking)
FISHERMAN'S TRAIL / MAIN MEDLICOTT DOME ACCESS (climber and hiker parking)
POTHOLE DOME SHUTTLE STOP (hiker and climber parking)
TUOLUMNE MEADOWS RANGER STATION
WILDERNESS PERMIT OFFICE
Tuolumne River
Cathedral Creek
Delaney Creek
Dog Lake
Pothole Dome
LEMBERT DOME
TUOLUMNE MEADOWS
Fairview Dome
Polly Dome Lakes
Wilderness Boundary
Boundary

LAMB / MARIUOLUMNE DOME ACCESS (climber parking)
WHIZ DOME ACCESS (climber parking)
MEDLICOTT DOME ACCESS (climber parking)
FISHERMAN'S TRAIL / MAIN MEDLICOTT DOME ACCESS (climber and hiker parking)
SPRING HILL (climber parking)
PHOBOS CLIFF / PYWIACK DOME ACCESS (climber parking)
STATELY PLEASURE / POLLY DOME ACCESS (hiker, climber, and spectator parking)
LOW PROFILE DOME ACCESS (climber parking)
DOSIER DOME ACCESS (climber parking)
MAIN PYWIACK DOME ACCESS (climber parking)
TENAYA LAKE PICNIC AREA (visitor, hiker, and climber parking)
TENAYA LAKE STRIP PARKING
MURPHY CREEK TRAILHEAD (hiker parking)
TENAYA LAKE ACCESS TURNOUTS
SUNRISE LAKES TRAILHEAD (hiker parking)
OLMSTED CANYON (climber parking)
OLMSTED VIEW POINT (visitor, and hiker parking)
POTHOLE DOME SHUTTLE STOP (hiker and climber parking)
TUOLUMNE MEADOWS STRIP PARKING
VISITOR CENTER (visitor parking)
TUOLUMNE MEADOWS LODGE (guest and visitor parking)
TUOLUMNE MEADOWS RANGER STATION
WILDERNESS PERMIT OFFICE (backpacker parking)
TUOLUMNE MEADOWS CAMPGROUND
TUOLUMNE MEADOWS STORE AND GRILL (customer parking)
GAS STATION AND CLIMBING STORE (customer shopping)
Pothole Dome
LEMBERT DOME
TUOLUMNE
MEADOWS
Fairview Dome
Wilderness Boundary
Creek
Polly Dome Lakes
Medlicott Dome
POLLY DOME
Pywiack Dome
Cathedral Lakes
Budd Lake
Budd Creek
Unicorn Creek
Elizabeth Lake
Murphy Creek
Tenaya Lake
Mildred Lake
OLMSTED POINT
Sunrise Lakes
Tenaya
LEGEND:
◆ TUOLUMNE MEADOWS DEVELOPMENT
● TIOGA ROAD ACTIVITY ACCESS
0 1/4 1/2 1 MILE
N

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ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY
UNITED STATES DEPARTMENT OF THE INTERIOR
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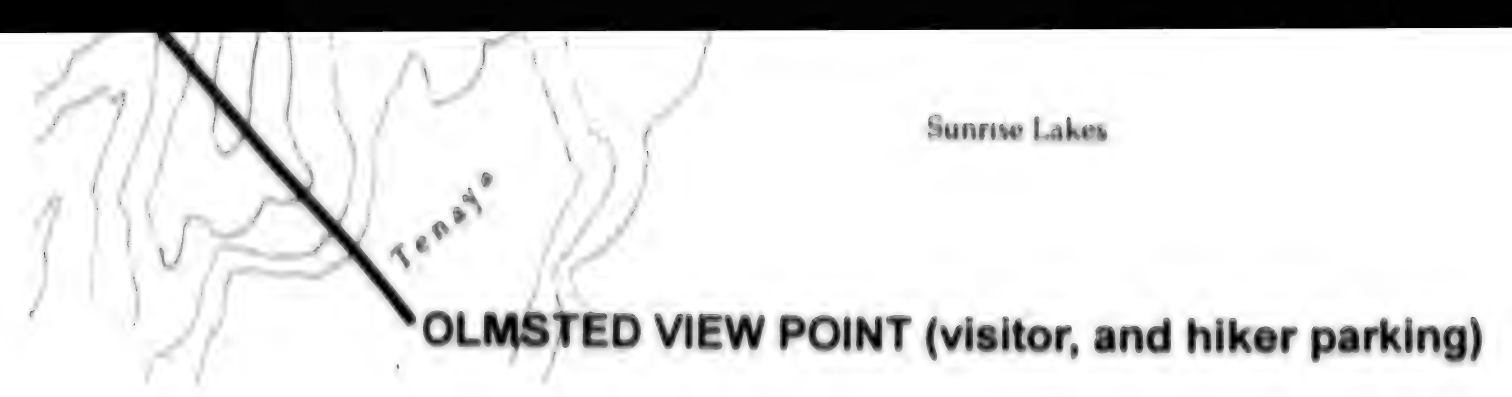

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MODES FEASIBILITY STUDY

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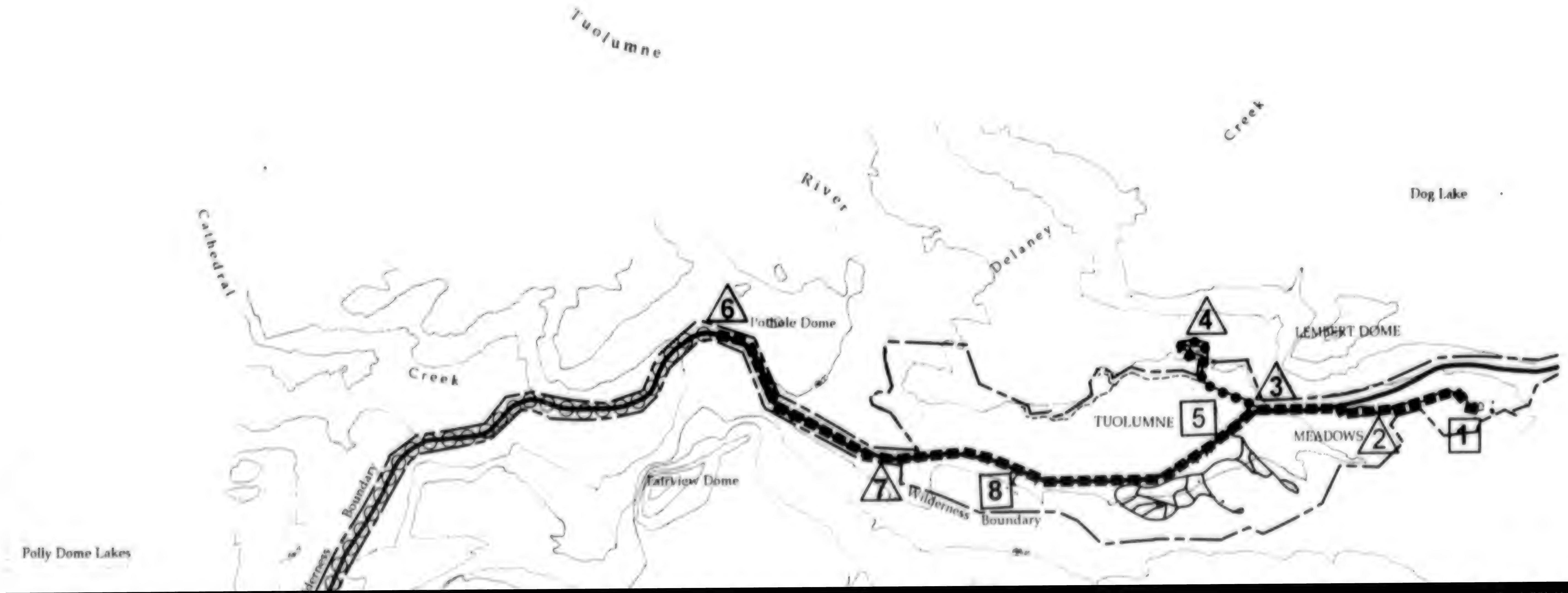
18



TUOLUMNE MEADOWS/ TIOGA ROAD SHUTTLE DESCRIPTIONS

LEGEND:

TENAYA LAKE EXPRESS / TUOLUMNE LOCAL SHUTTLE ROUTES

TENAYA LAKE EXPRESS SHUTTLE ROUTE ONLY

TUOLUMNE MEADOWS LOCAL SHUTTLE ROUTE ONLY

● EXPRESS SHUTTLE STOPS

△ LOCAL SHUTTLE STOPS

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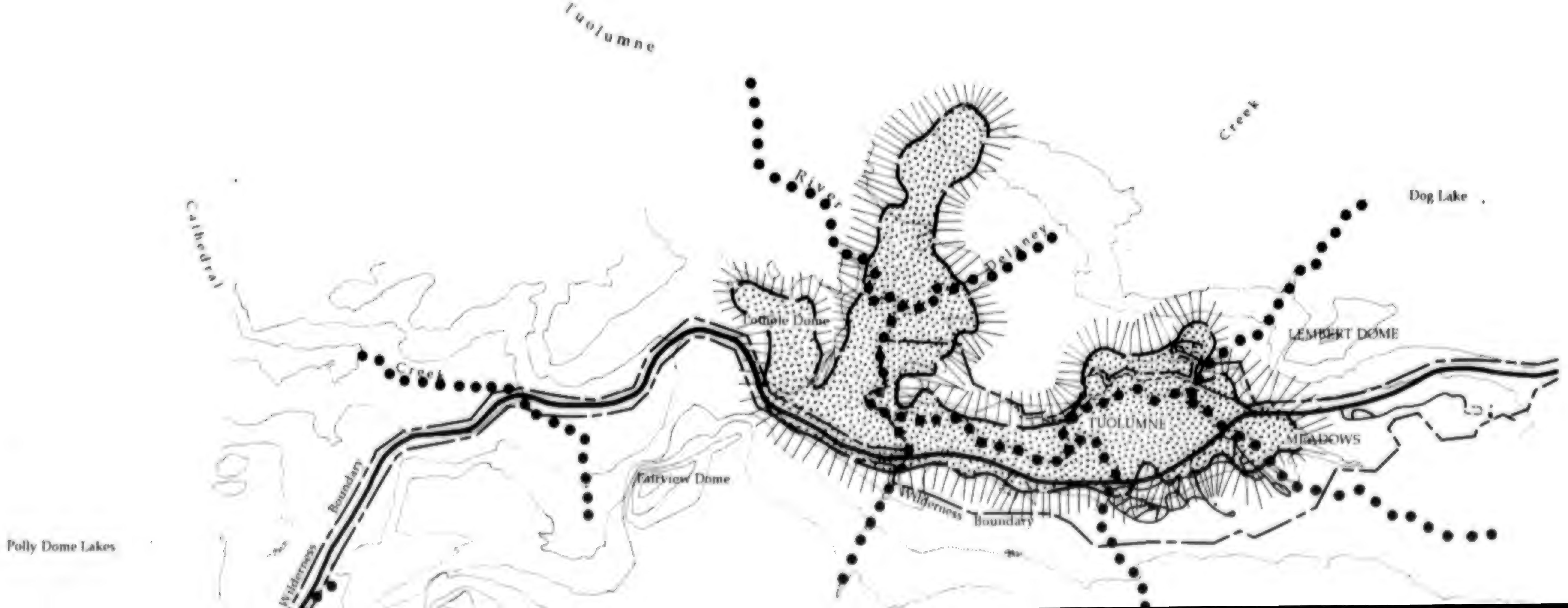
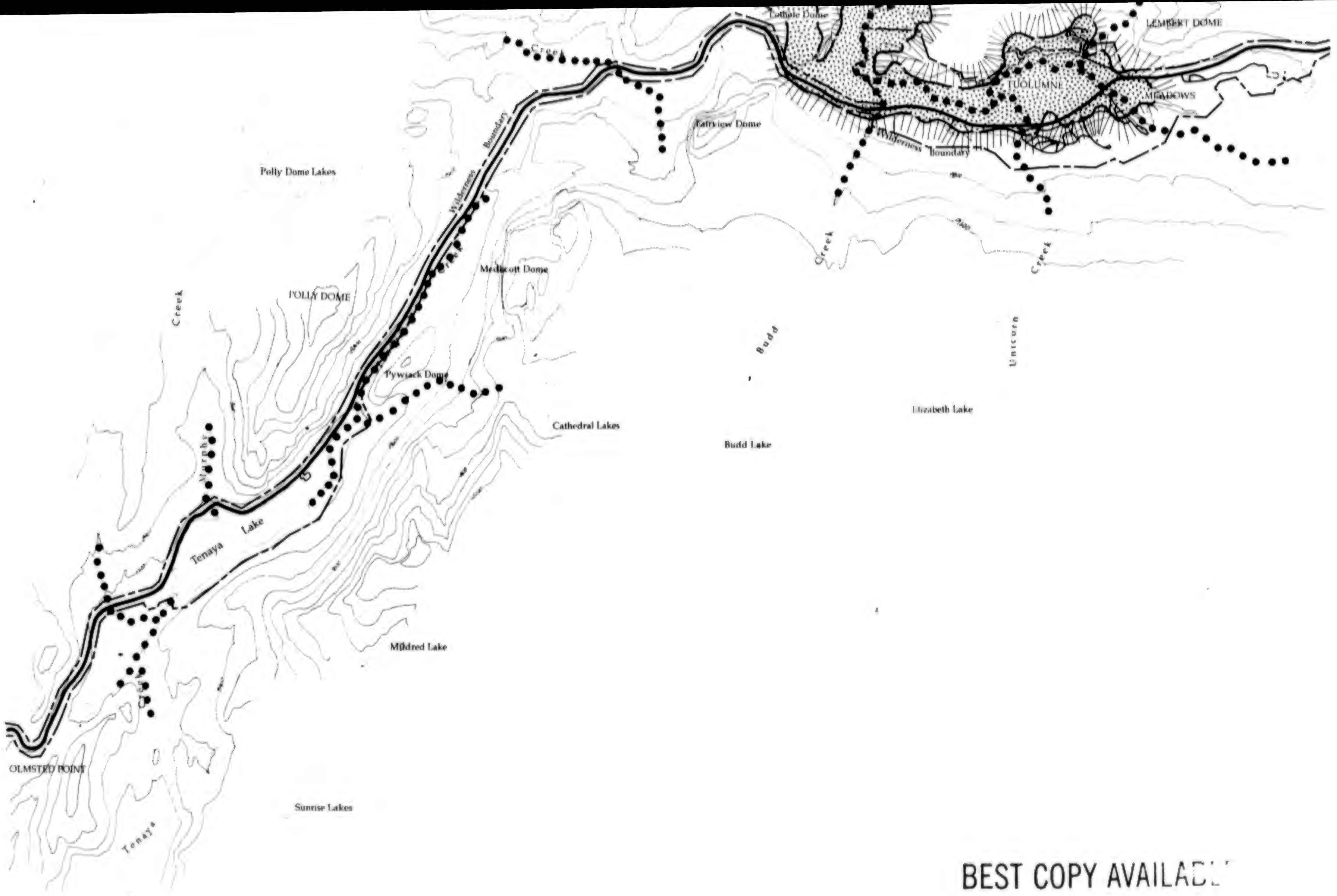
19

TUOLUMNE MEADOWS/ TIOGA ROAD HABITAT CONCERNS





LEGEND:

●●●●● **RIPARIAN / STREAM EDGE VEGETATION AND WETLANDS**

▨ **MEADOW**

MEADOW EDGE

0 1/4 1/2 1 MILE

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ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC / SEPT 93 / 104 20116

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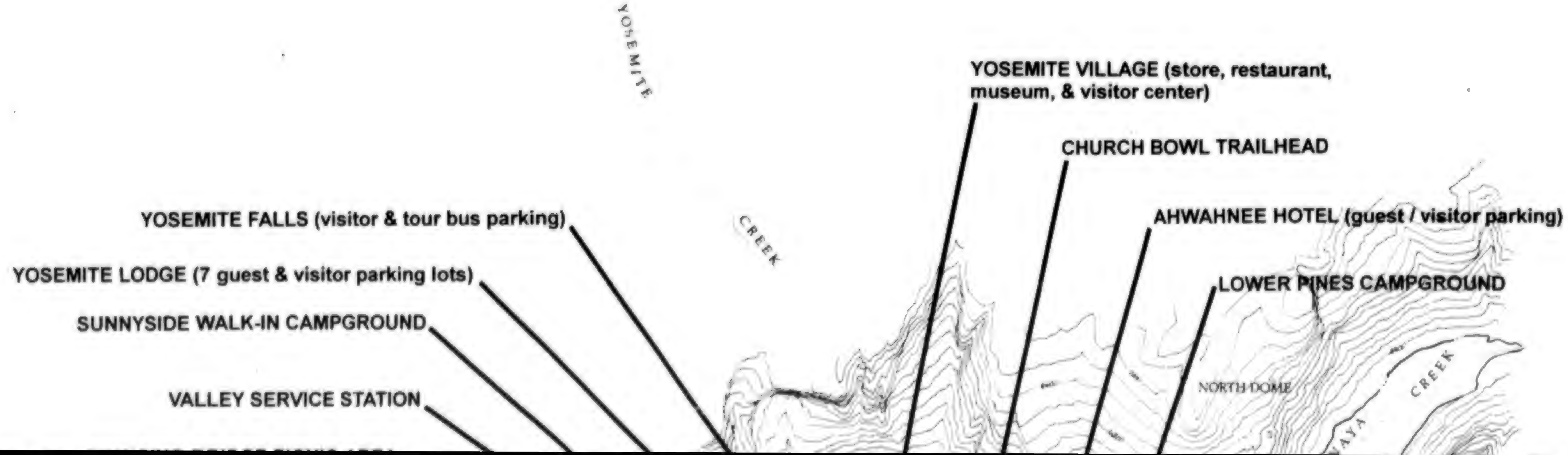
20

YOSEMITE VALLEY AREA DETAIL

LEGEND:

▨ **PRIMARY DEVELOPMENT CLUSTERS**


YOSEMITE CREEK
YOSEMITE VILLAGE (store, restaurant, museum, & visitor center)
CHURCH BOWL TRAILHEAD
YOSEMITE FALLS (visitor & tour bus parking)
AHWAHNEE HOTEL (guest / visitor parking)
YOSEMITE LODGE (7 guest & visitor parking lots)
LOWER PINES CAMPGROUND
SUNNYSIDE WALK-IN CAMPGROUND
VALLEY SERVICE STATION
NORTH DOME
TENAYA CREEK

YOSEMITE FALLS (visitor & tour bus parking)
YOSEMITE LODGE (7 guest & visitor parking lots)
SUNNYSIDE WALK-IN CAMPGROUND
VALLEY SERVICE STATION
SWINGING BRIDGE PICNIC AREA (general visitor parking)
FOUR MILE TRAILHEAD (hiker parking)
YELLOW PINE / SENTINEL BEACH
EL CAPITAN EAST PARKING PULLOUTS
AHWAHNEE HOTEL (guest / visitor parking)
LOWER PINES CAMPGROUND
NORTH PINES CAMPGROUND/ GROUP CAMP
STABLES
MIRROR LAKE TRAILHEAD
HAPPY ISLES NATURE CENTER
UPPER PINES CAMPGROUND
CURRY ORCHARD, (primary day use visitor parking)
CURRY VILLAGE (6 visitor parking lots)
RIVERSIDE CAMPGROUNDS
HOUSEKEEPING CAMP
CAMP 6 (employee housing and day use parking)
YOSEMITE CHAPEL (general visitor parking)
BRIDALVEIL FALLS ACCESS (general visitor parking)
VALLEY VIEW PULLOUT (general visitor & valley tour parking)
CREEK
TENAYA CREEK
NORTH DOME
Mirror Lake
HALF DOME
THREE BROTHERS
Ribbon Falls
EL CAPITAN
SENTINEL ROCK
GLACIER POINT
SENTINEL DOME
Vernal Falls
Nevada Falls
MERCED RIVER
DISCOVERY VIEW
Bridalveil Falls
TAFT POINT
0 1/4 1/2 1 MILE
N

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VALLEY VIEW PULLOUT (general visitor & valley tour parking)

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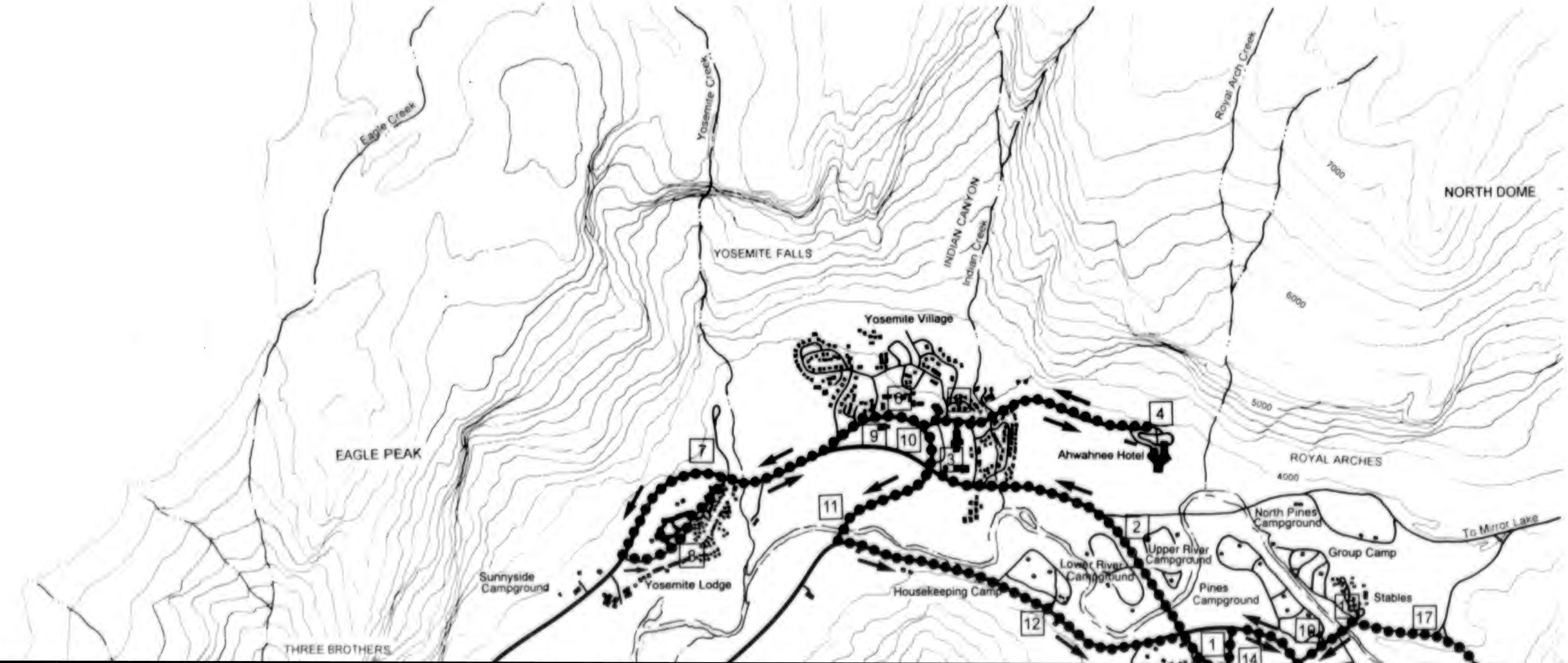


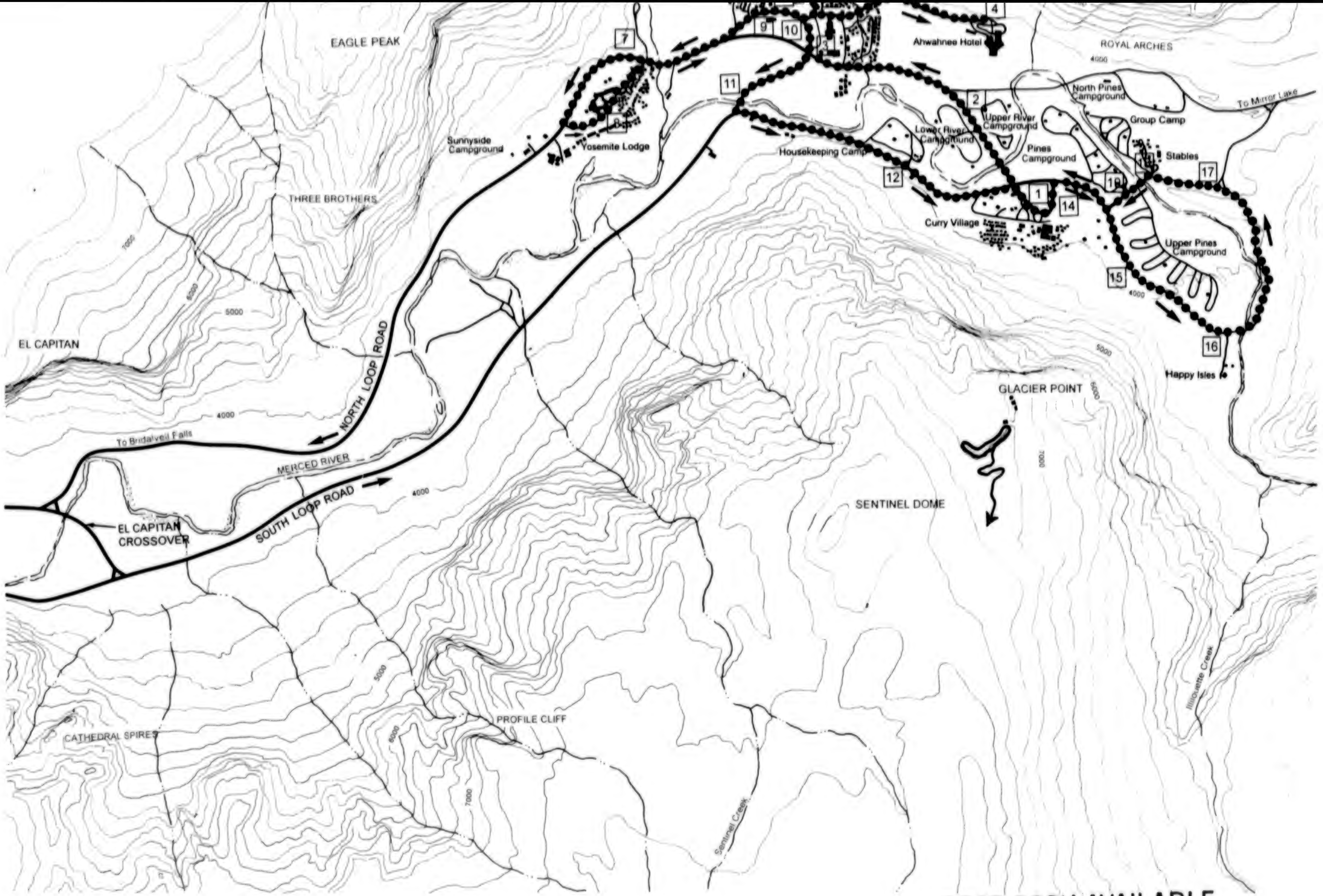
YOSEMITE VALLEY SHUTTLE DESCRIPTION

LEGEND:

●●●●●●●● VALLEY SHUTTLE ROUTE

SHUTTLE BUS STOP LOCATIONS

1	PRIMARY DAY-USE PARKING / CURRY VILLAGE
2	UPPER AND LOWER RIVER CAMPGROUNDS
3	YOSEMITE VILLAGE / VILLAGE STORE
4	AHWAHNEE HOTEL
5	YOSEMITE VILLAGE / DEGNAN'S STORE
6	VISITOR CENTER
7	YOSEMITE FALLS (service ends at 8:00 P.M.)
8	YOSEMITE LODGE / SUNNYSIDE WALK-IN CAMP
9	VISITOR CENTER



- 4 AHWAHNEE HOTEL
- 5 YOSEMITE VILLAGE / DEGNAN'S STORE
- 6 VISITOR CENTER
- 7 YOSEMITE FALLS (service ends at 8:00 P.M.)
- 8 YOSEMITE LODGE / SUNNYSIDE WALK-IN CAMP
- 9 VISITOR CENTER
- 10 YOSEMITE VILLAGE / VILLAGE STORE
- 11 SENTINEL BRIDGE / PARKING FOR CHAPEL
- 12 HOUSEKEEPING CAMP / LE CONTE MEMORIAL
- 14 PRIMARY DAY-USE PARKING / CURRY VILLAGE
- 15 UPPER PINES CAMPGROUND
- 16 HAPPY ISLES (service ends at 7:30 P.M.)
- 17 MIRROR LAKE TRAIL (service ends at 7:30 P.M.)
- 18 STABLES (service ends at 7:30 P.M.)
- 19 LOWER PINES CAMPGROUND

0 1000 2000 4000 FEET

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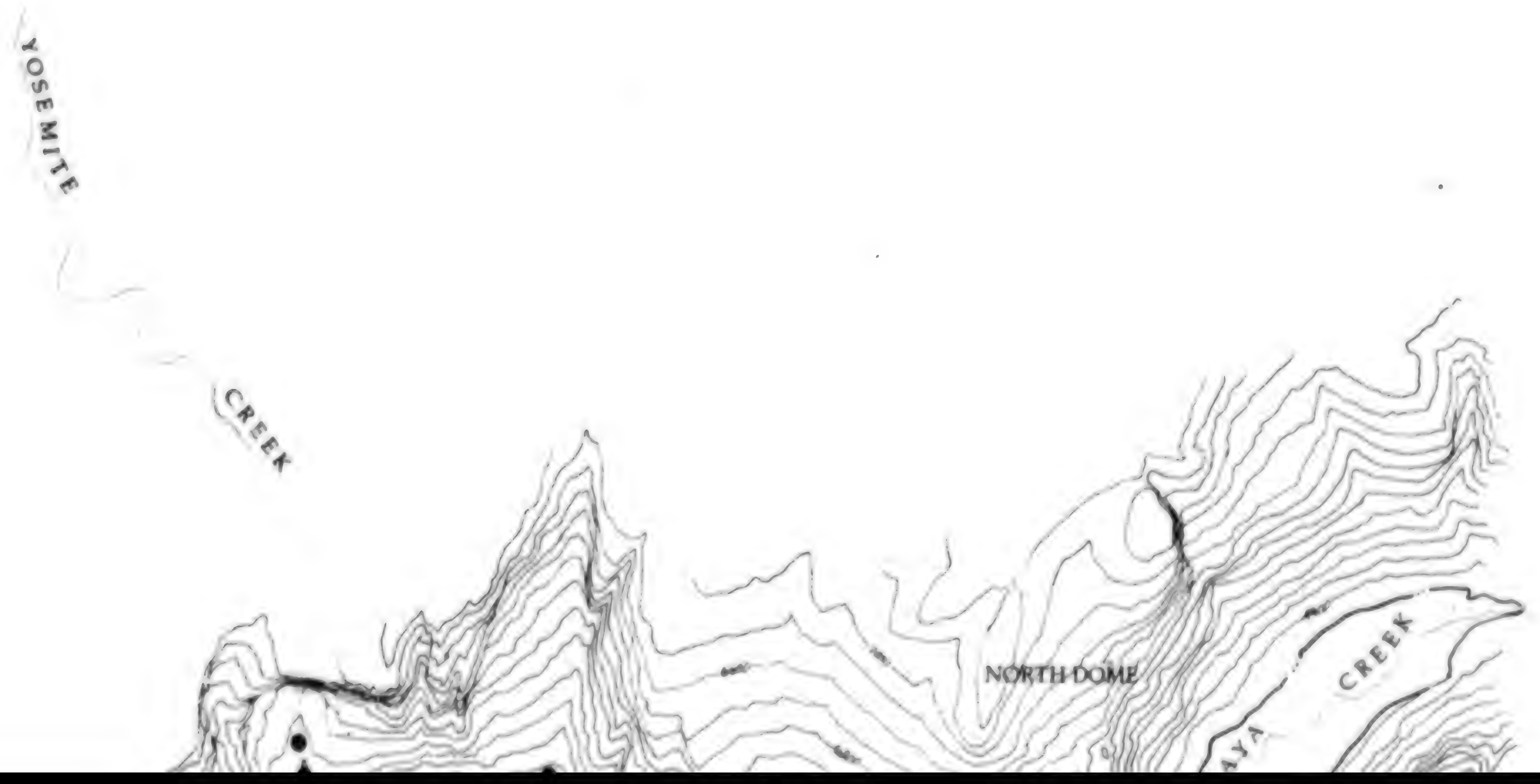
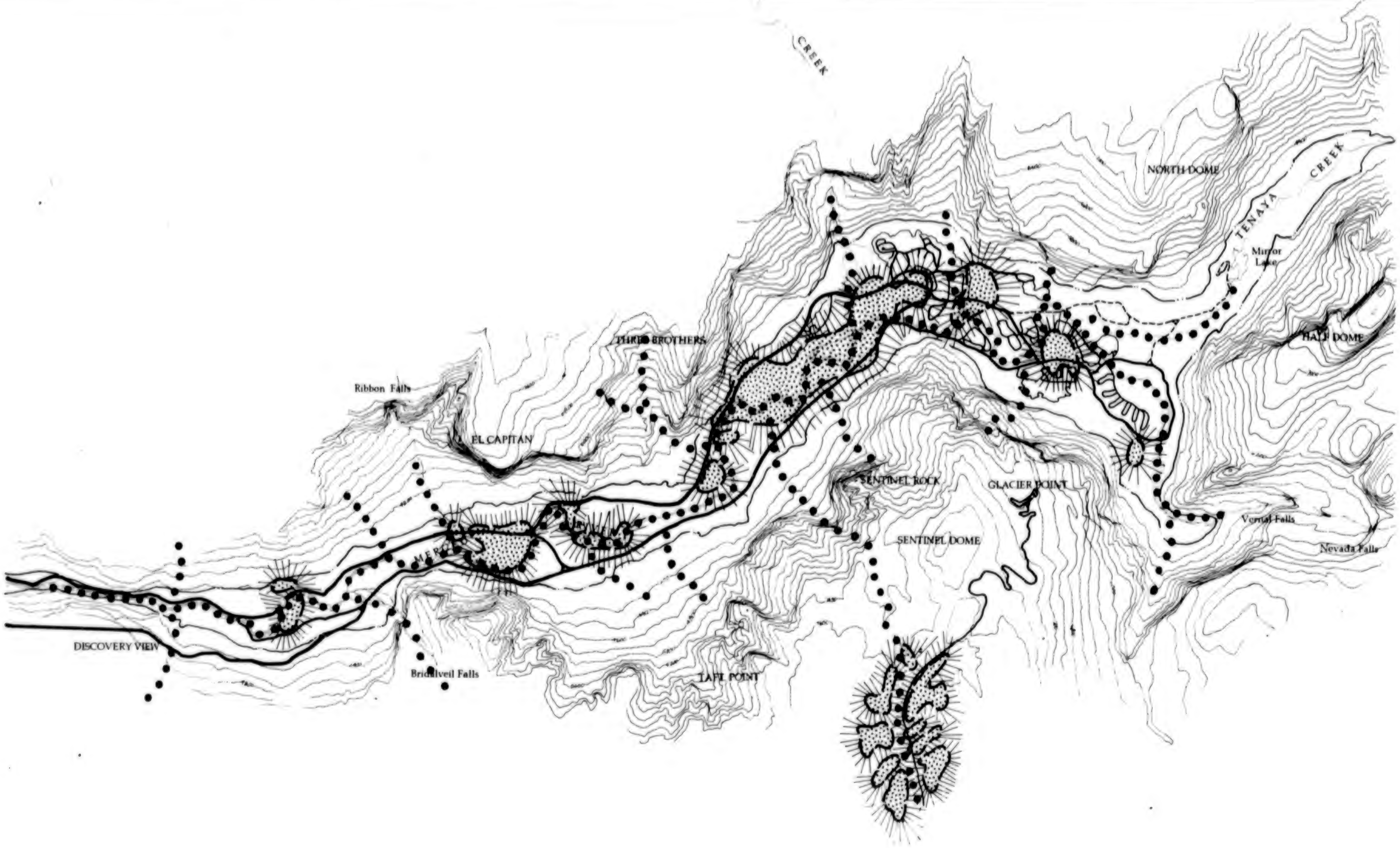
22

YOSEMITE VALLEY AND VICINITY HABITAT CONCERNS





LEGEND:

●●●●●●●● RIPARIAN / STREAM EDGE VEGETATION AND WETLANDS

▨ MEADOW

MEADOW EDGE

0 1/4 1/2 1 MILE

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MODES FEASIBILITY STUDY
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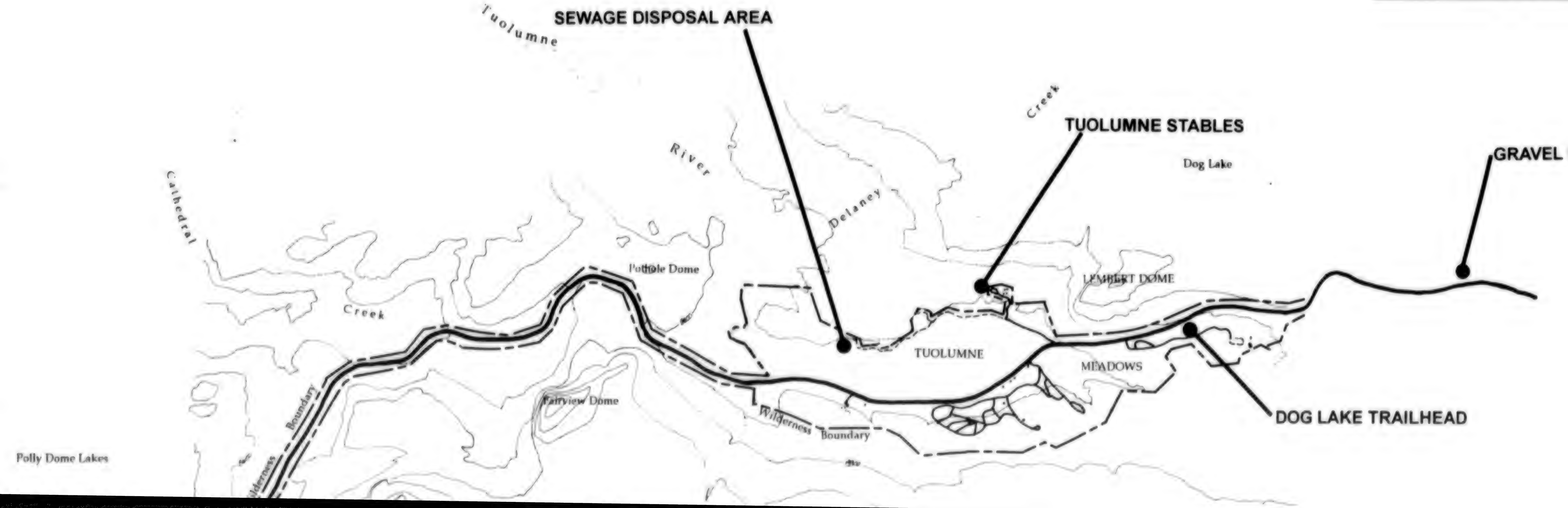
23

TUOLUMNE MEADOWS/ TIOGA ROAD STAGING AREA OPTIONS



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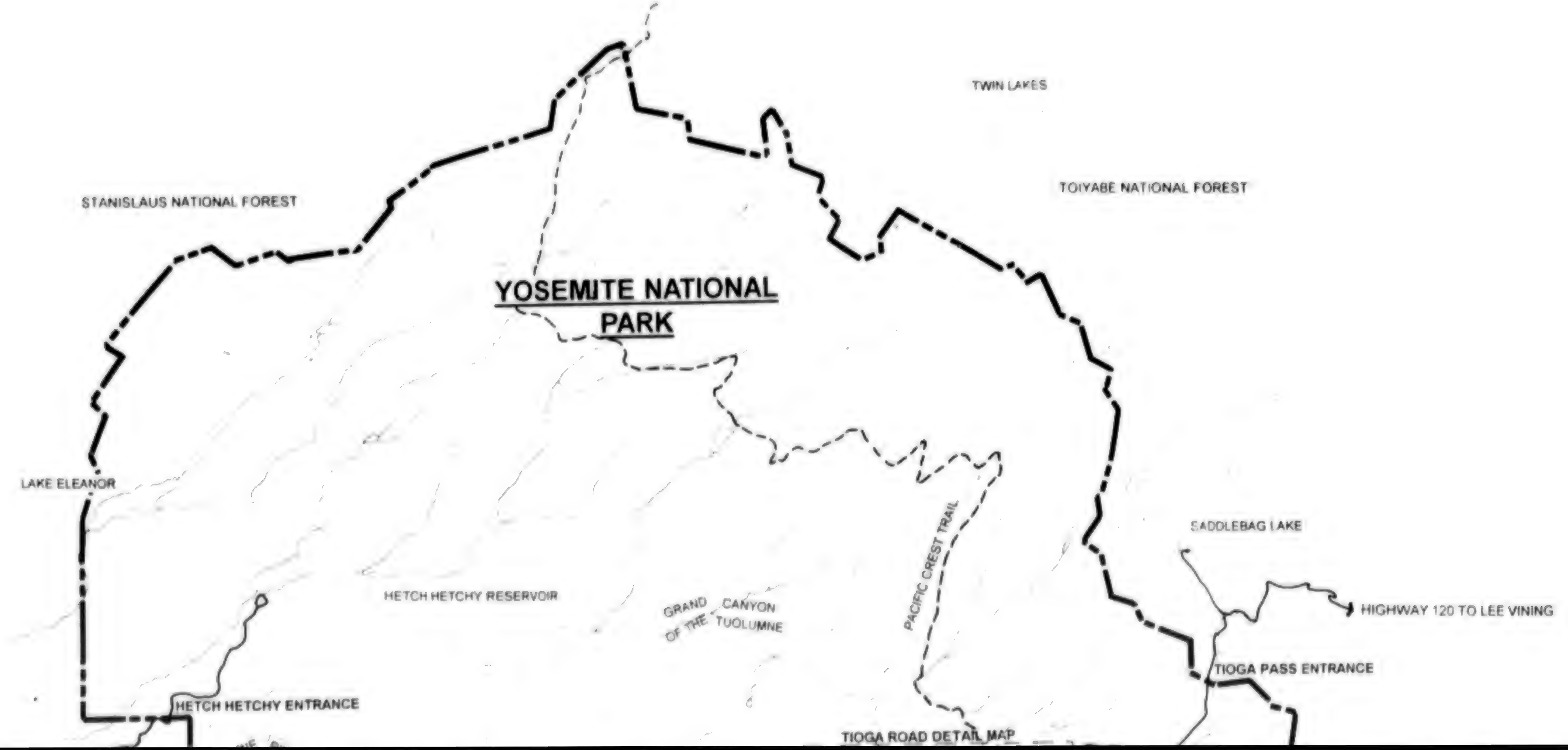
24

POTENTIAL REMOTE VALLEY STAGING AREAS

LEGEND:

● **REMOTE IN-PARK STAGING AREAS** (El Portal also included in this category)

■ **STAGING AREAS OUTSIDE PARK**



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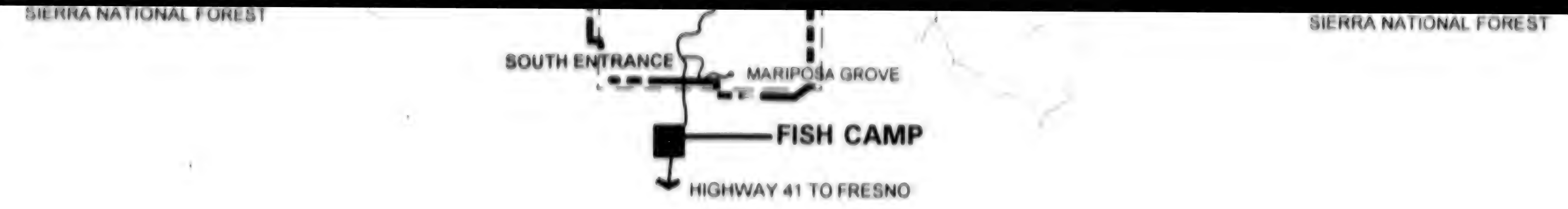

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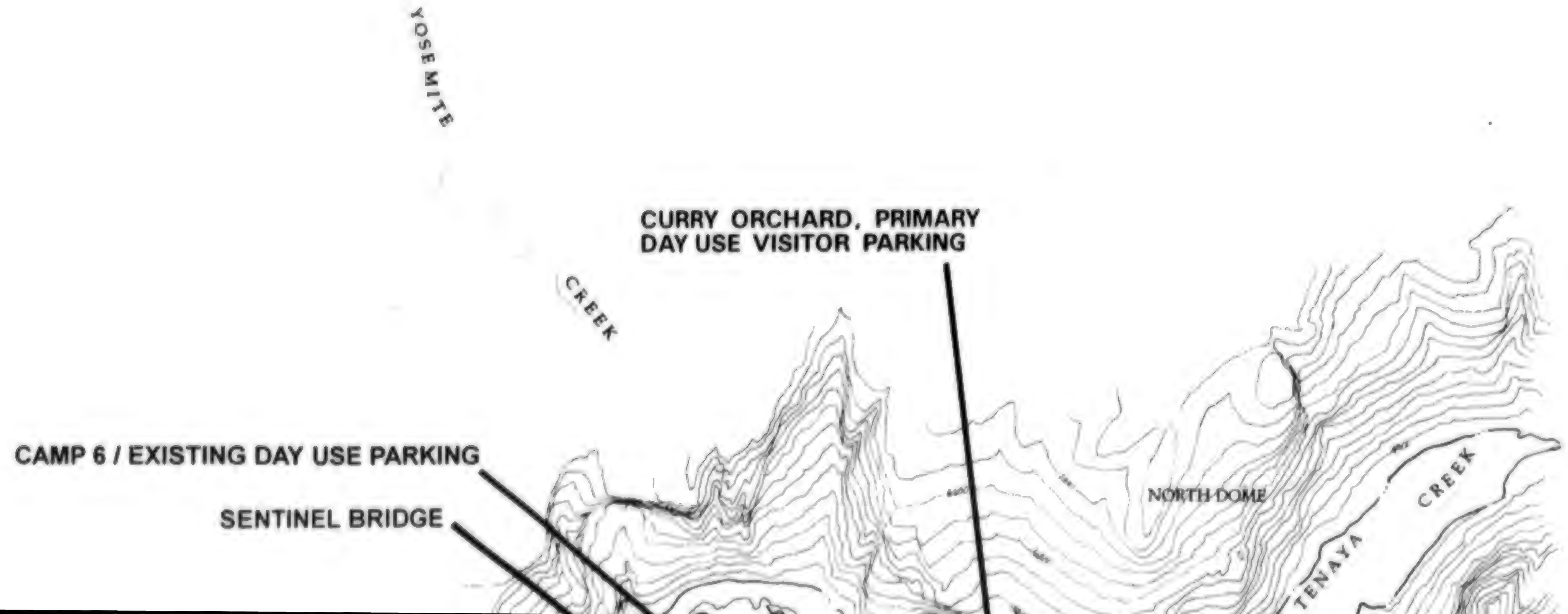
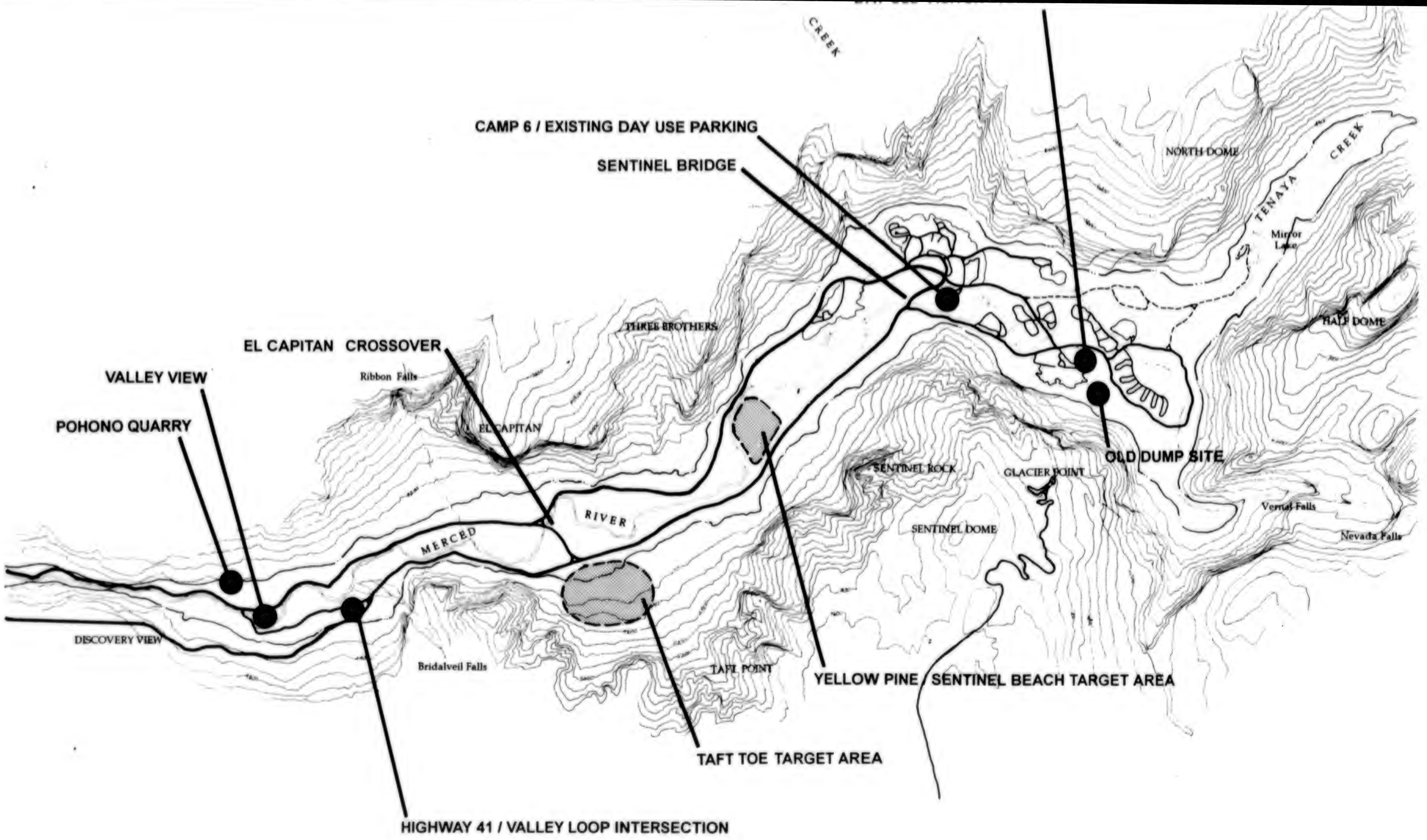
MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

YOSEMITE VALLEY STAGING OPTIONS


YOSEMITE CREEK
CURRY ORCHARD, PRIMARY DAY USE VISITOR PARKING
CAMP 6 / EXISTING DAY USE PARKING
SENTINEL BRIDGE
NORTH DOME
TENAYA CREEK



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UNITED STATES DEPARTMENT OF THE INTERIOR
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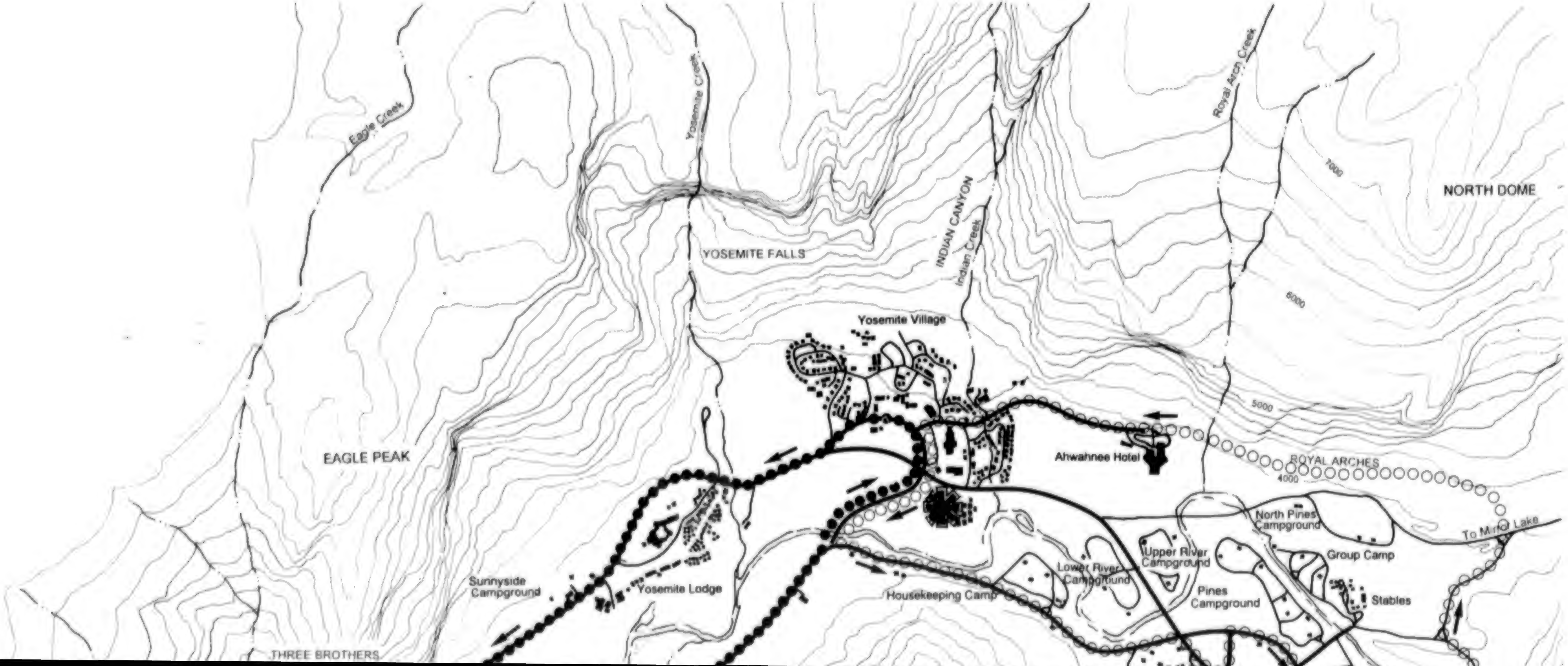
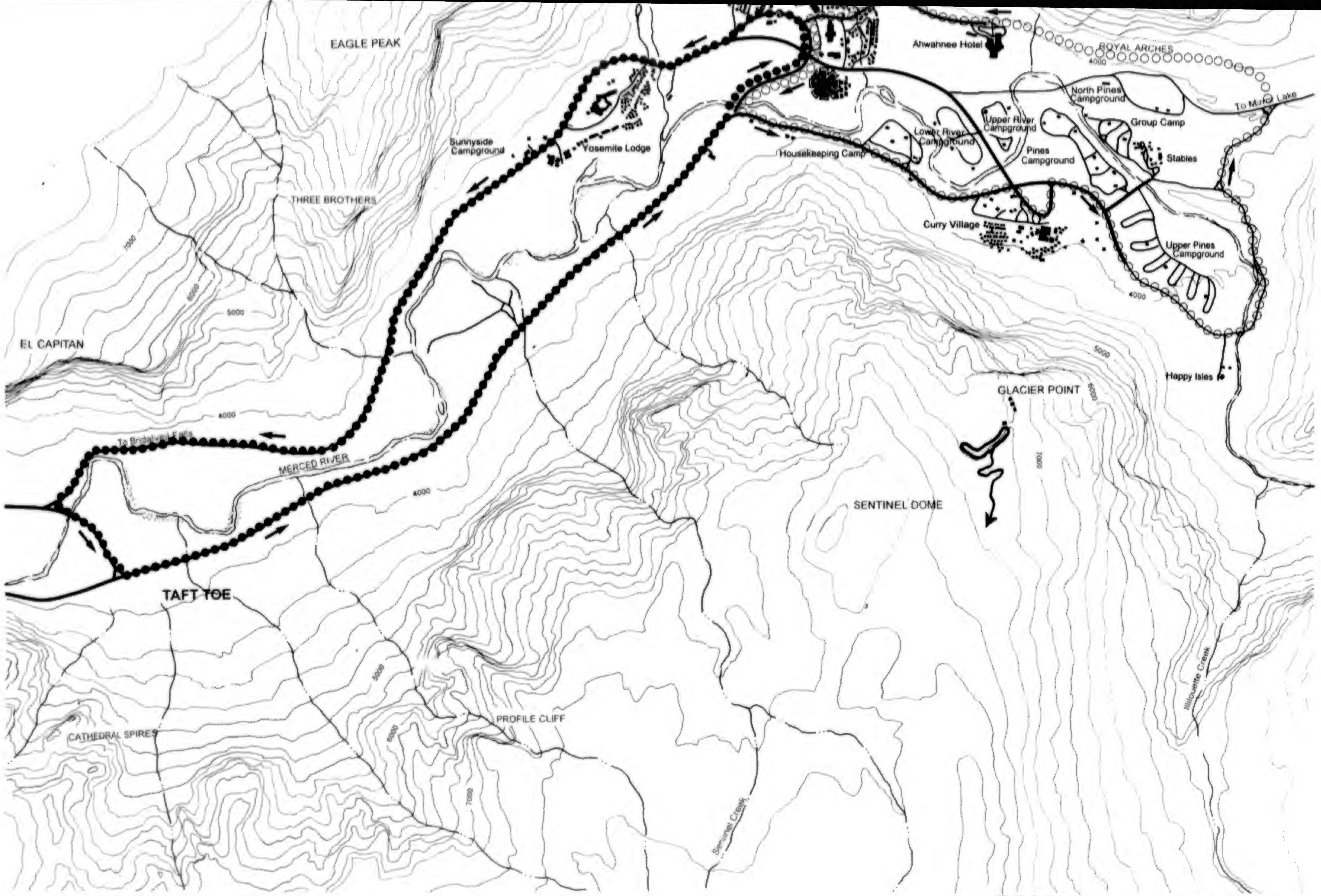
26

YOSEMITE VALLEY LOOP VTS ALTERNATIVE





LEGEND:

YOSEMITE

NATIONAL PARK

ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC/APRIL 94/184 20131A

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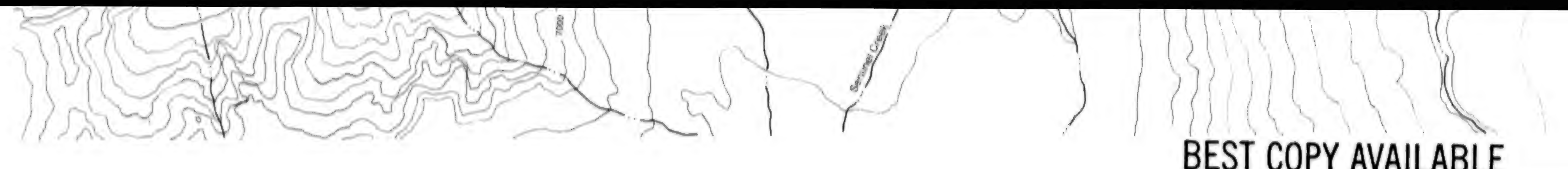

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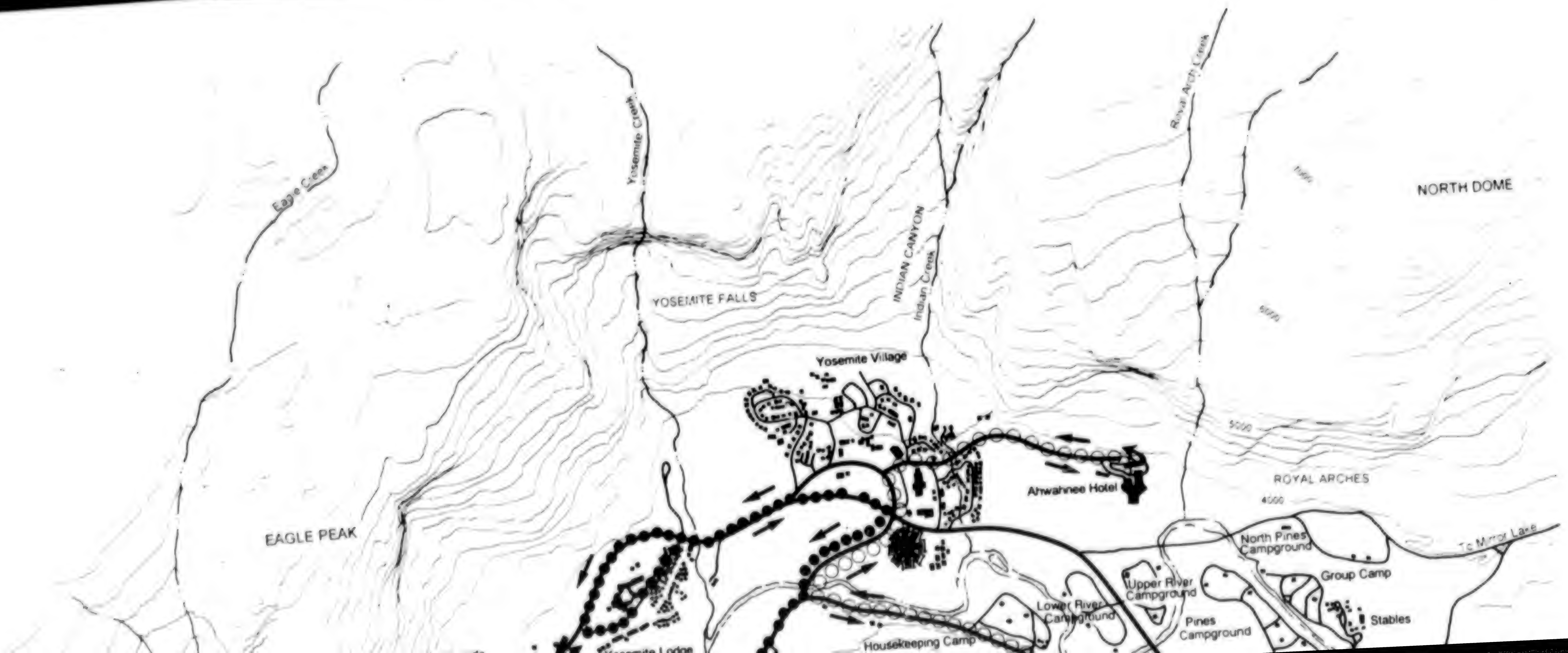
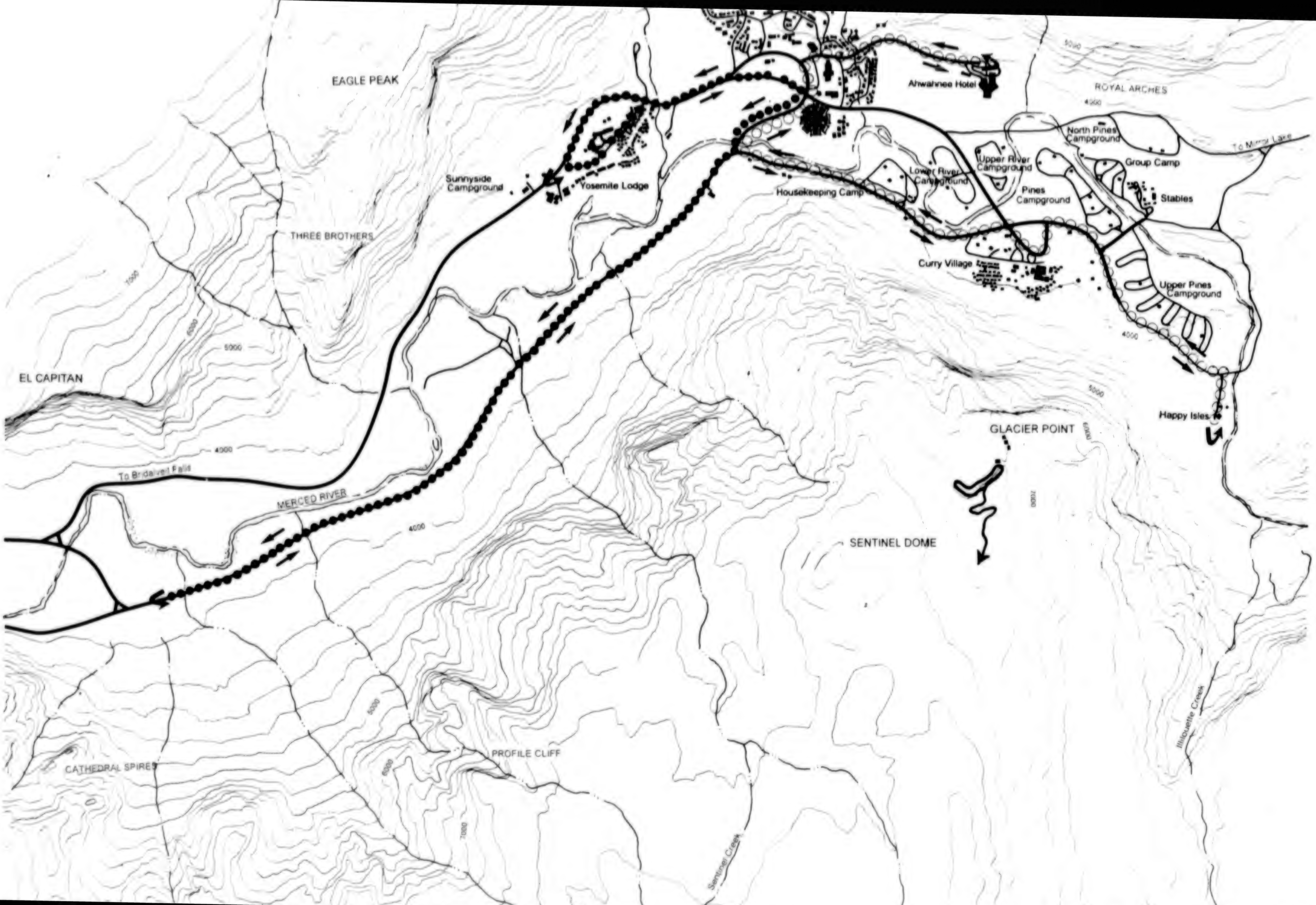
27

YOSEMITE VALLEY BI DIRECTIONAL VTS ALTERNATIVE





LEGEND:

- ●●●●●●● YOSEMITE VALLEY CONNECTOR SHUTTLE ROUTE
- ○○○○○○ YOSEMITE VALLEY CIRCULATOR SHUTTLE ROUTE
- ✺ TRANSFER FACILITY

0 1000 2000 4000 FEET

N

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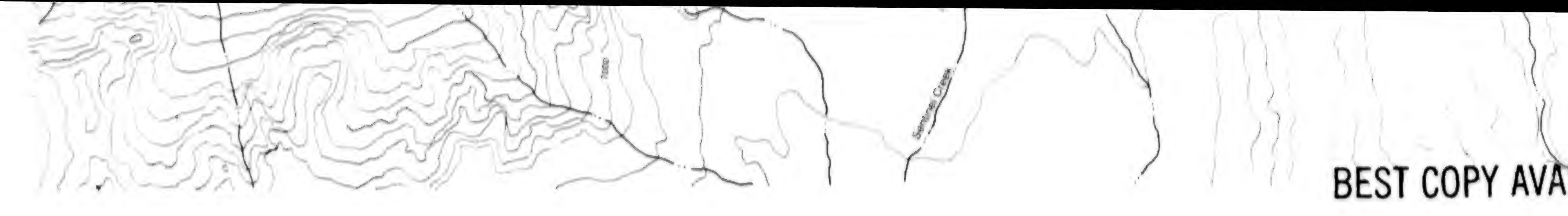

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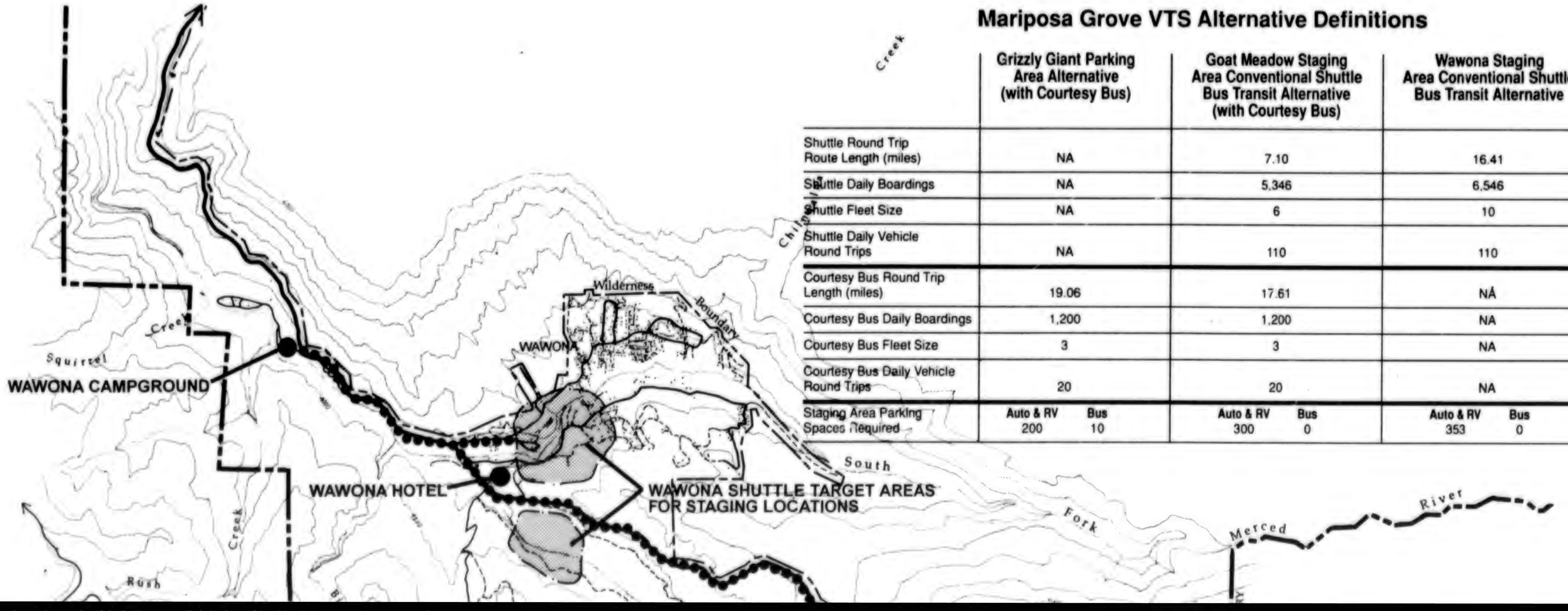
MARIPOSA GROVE ACCESS ALTERNATIVES

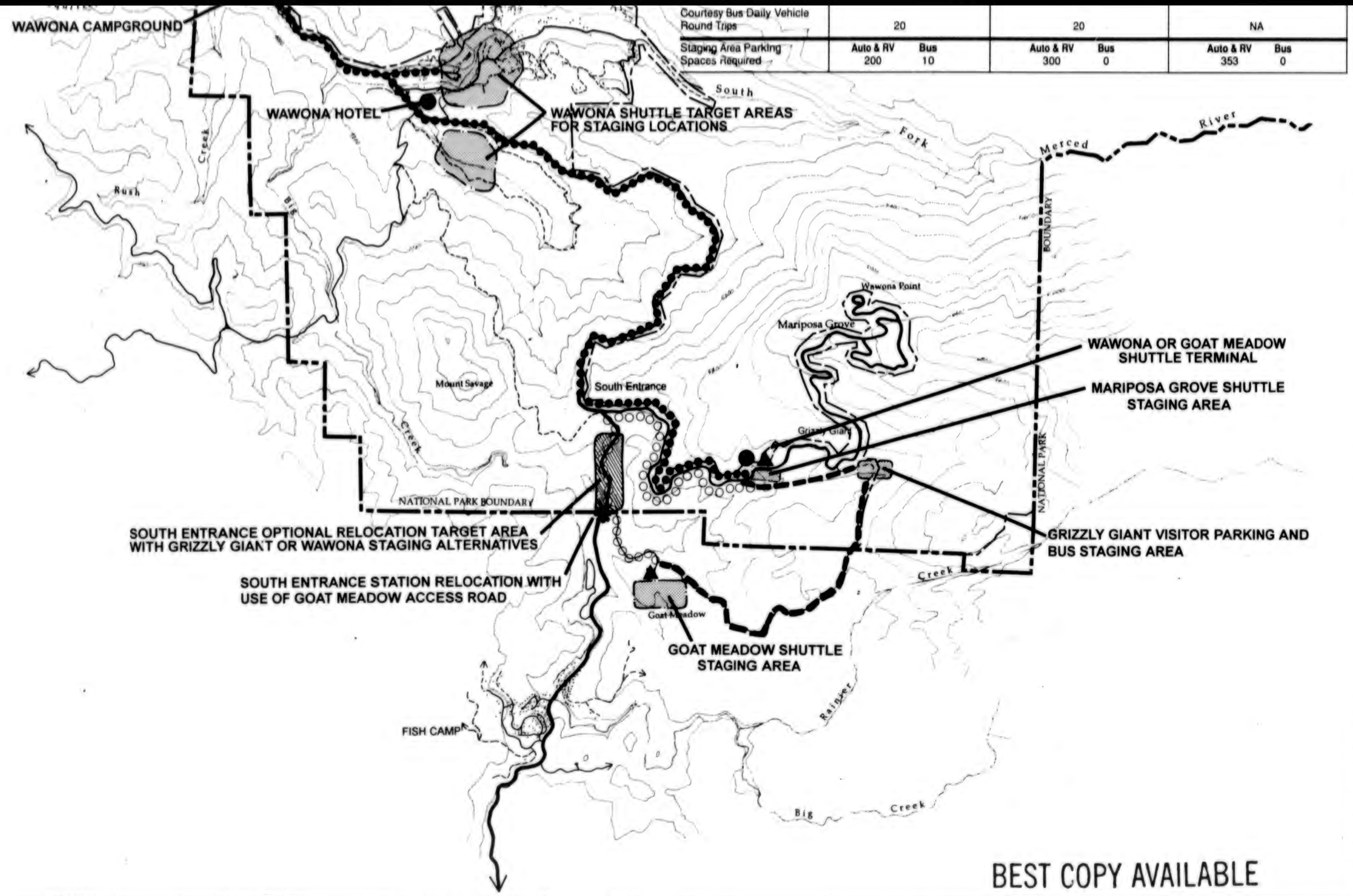


Mariposa Grove VTS Alternative Definitions

	Grizzly Giant Parking Area Alternative (with Courtesy Bus)	Goat Meadow Staging Area Conventional Shuttle Bus Transit Alternative (with Courtesy Bus)	Wawona Staging Area Conventional Shuttle Bus Transit Alternative
Shuttle Round Trip Route Length (miles)	NA	7.10	16.41
Shuttle Daily Boardings	NA	5,346	6,546
Shuttle Fleet Size	NA	6	10
Shuttle Daily Vehicle Round Trips	NA	110	110
Courtesy Bus Round Trip Length (miles)	19.06	17.61	NA
Courtesy Bus Daily Boardings	1,200	1,200	NA
Courtesy Bus Fleet Size	3	3	NA
Courtesy Bus Daily Vehicle Round Trips	20	20	NA
Staging Area Parking Spaces Required	Auto & RV 200 Bus 10	Auto & RV 300 Bus 0	Auto & RV 353 Bus 0

LEGEND:

Courtesy Bus Daily Vehicle Round Trips	20		20		NA	
Staging Area Parking Spaces Required	Auto & RV 200	Bus 10	Auto & RV 300	Bus 0	Auto & RV 353	Bus 0


WAWONA CAMPGROUND
WAWONA HOTEL
WAWONA SHUTTLE TARGET AREAS FOR STAGING LOCATIONS
South Fork Merced River
Rush Creek
Big Creek
Mount Savage
South Entrance
Wawona Point
Mariposa Grove
Grizzly Giant
WAWONA OR GOAT MEADOW SHUTTLE TERMINAL
MARIPOSA GROVE SHUTTLE STAGING AREA
NATIONAL PARK BOUNDARY
SOUTH ENTRANCE OPTIONAL RELOCATION TARGET AREA WITH GRIZZLY GIANT OR WAWONA STAGING ALTERNATIVES
SOUTH ENTRANCE STATION RELOCATION WITH USE OF GOAT MEADOW ACCESS ROAD
GRIZZLY GIANT VISITOR PARKING AND BUS STAGING AREA
Goat Meadow
GOAT MEADOW SHUTTLE STAGING AREA
Creek
Rainier Creek
FISH CAMP
Big Creek
0 1/4 1/2 1 MILE
N

LEGEND:

- GRIZZLY GIANT PARKING ALTERNATIVE; OPTIONAL ROADWAY ALIGNMENTS
- GOAT MEADOW STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ▲ GOAT MEADOW SHUTTLE STOPS
- WAWONA STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ● WAWONA SHUTTLE STOPS

NOTES:
1. Separate Courtesy Shuttle Provided for Wawona Campground and Wawona Hotel Guests with Goat Meadow Staging or Grizzly Giant Parking Alternatives.
2. Tour Buses Maintain Direct Access to Mariposa Grove under each Alternative.

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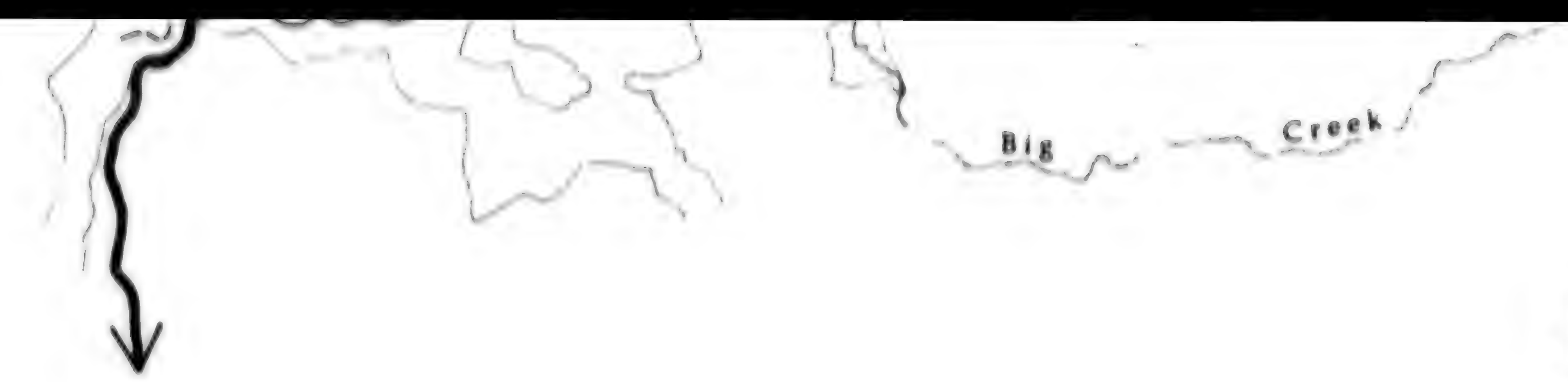

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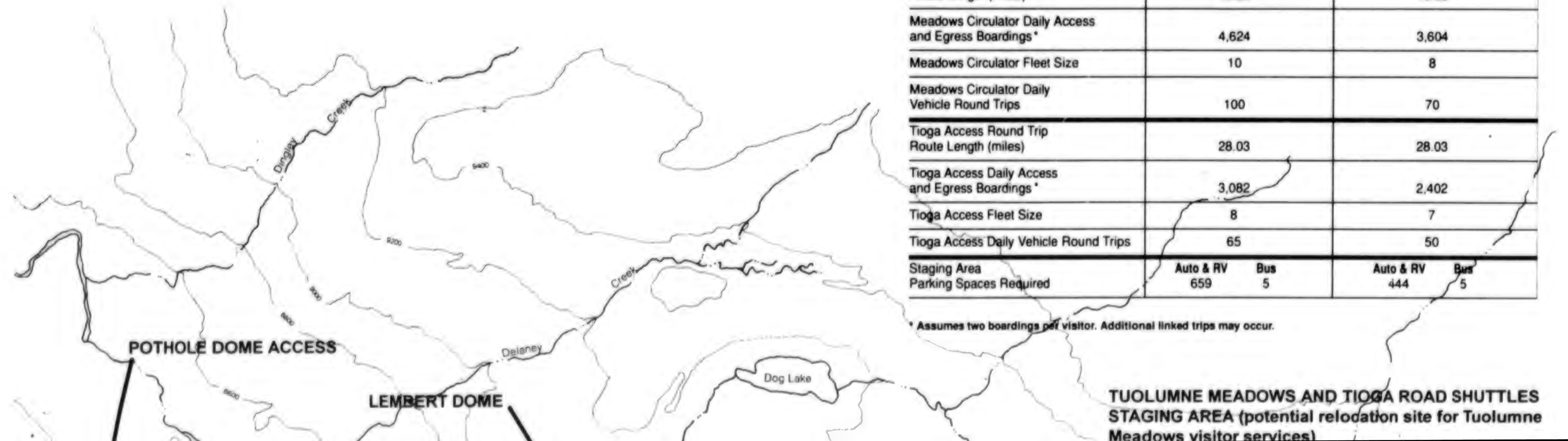
TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVE

Toulumne Meadows VTS Alternative Definitions

	Mandatory Low Floor Shuttle Bus Transit Alternative	Voluntary Low Floor Shuttle Bus Transit Alternative
Meadows Circulator Round Trip Route Length (miles)	13.26	13.26
Meadows Circulator Daily Access and Egress Boardings *	4,624	3,604
Meadows Circulator Fleet Size	10	8
Meadows Circulator Daily Vehicle Round Trips	100	70
Tioga Access Round Trip Route Length (miles)	28.03	28.03
Tioga Access Daily Access and Egress Boardings *	3,082	2,402
Tioga Access Fleet Size	8	7
Tioga Access Daily Vehicle Round Trips	65	50
Staging Area Parking Spaces Required	Auto & RV 659 Bus 5	Auto & RV 444 Bus 5

* Assumes two boardings per visitor. Additional linked trips may occur.


Dingley Creek
9400
9200
9000
8800
8600
Creek
Delaney
Dog Lake
POTHOLE DOME ACCESS
LEMBERT DOME
TUOLUMNE MEADOWS AND TIOGA ROAD SHUTTLES STAGING AREA (potential relocation site for Tuolumne Meadows visitor services)

Tioga Access Fleet Size	8	7
Tioga Access Daily Vehicle Round Trips	65	50
Staging Area Parking Spaces Required	Auto & RV 659 Bus 5	Auto & RV 444 Bus 5

¹ Assumes two boardings per visitor. Additional linked trips may occur.

POTHOLE DOME ACCESS
LEMBERT DOME
EXISTING TUOLUMNE STABLES
SODA SPRINGS TRAILHEAD (East)
TUOLUMNE MEADOWS AND TIOGA ROAD SHUTTLES STAGING AREA (potential relocation site for Tuolumne Meadows visitor services)
EXISTING GRAVEL PIT
TO OLMSTED POINT
POTHOLE DOME
LEMBERT DOME
Dog Lake
Delaney
Creek
TUOLUMNE MEADOWS
TIOGA ROAD
Wilderness Boundary
TUOLUMNE LODGE
DOG LAKE TRAILHEAD
WILDERNESS PERMIT OFFICE
TUOLUMNE RIVER
John Muir Trail
Crest Scenic Trail
CATHEDRAL LAKES AND JOHN MUIR TRAILHEAD
TUOLUMNE CAMPGROUND REGISTRATION OFFICE AND EXISTING VISITOR SERVICES
TUOLUMNE CAMPGROUND, (west end)
SODA SPRINGS TRAILHEAD (West)
EXISTING VISITOR CENTER
Unicorn Creek
Budd Creek
Rafferty Creek
UNICORN PEAK
Elizabeth Lake
Budd Lake
LEGEND:
TUOLUMNE MEADOWS CIRCULATOR AND TIOGA ROAD ACCESS SHUTTLE ROUTES
TUOLUMNE MEADOWS CIRCULATOR SHUTTLE ROUTE ONLY
TUOLUMNE MEADOWS CIRCULATOR SHUTTLE STOPS
TIOGA ROAD ACCESS SHUTTLE ROUTE ONLY
TIOGA ROAD ACCESS SHUTTLE STOPS
0
1500
3000
6000 FEET
N

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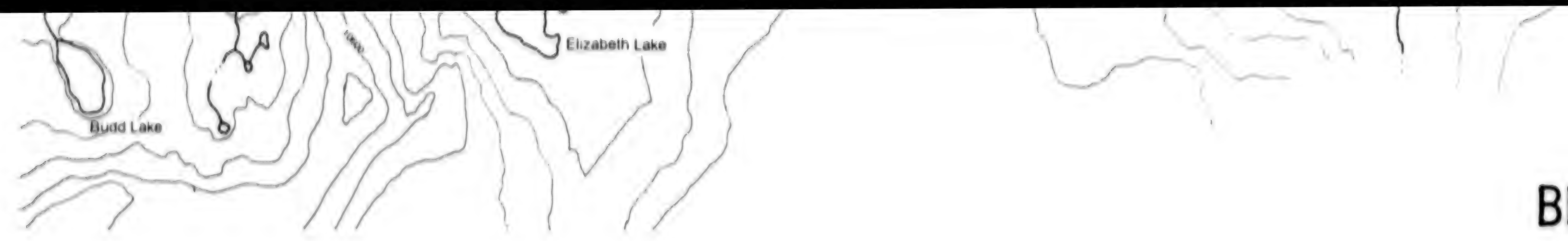

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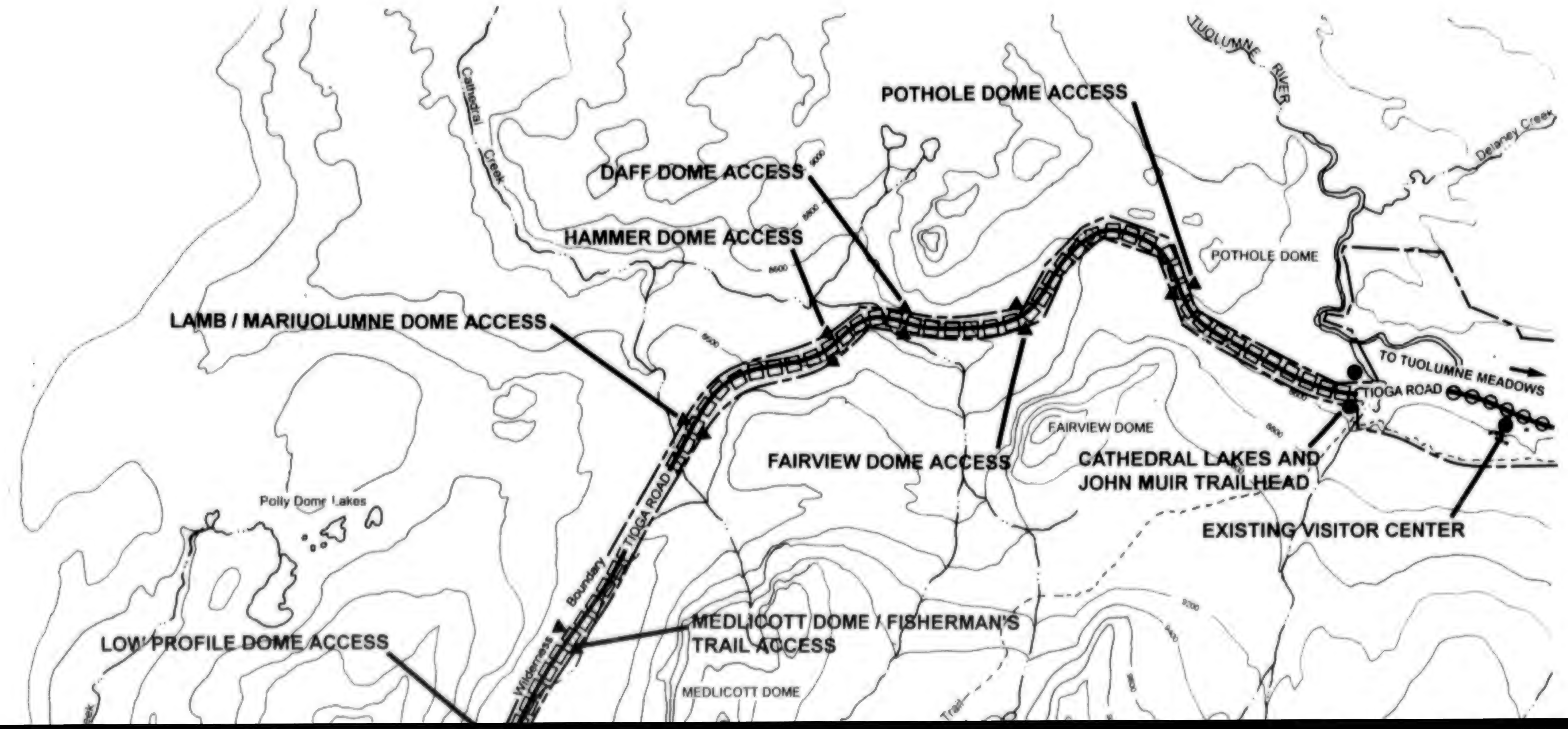
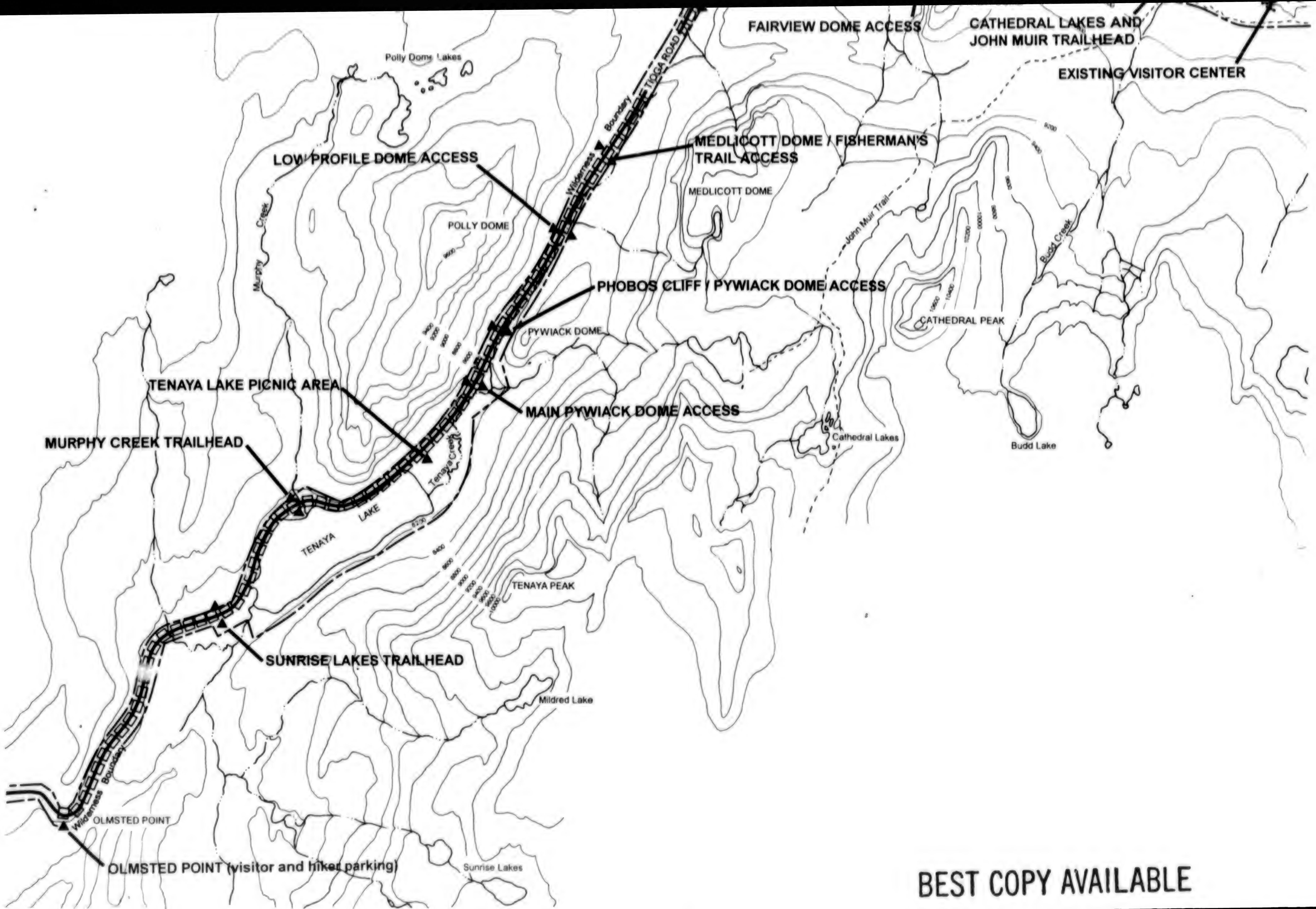


TIOGA ROAD ACCESS/ TUOLUMNE MEADOWS CIRCULATOR SHUTTLES ALTERNATIVE



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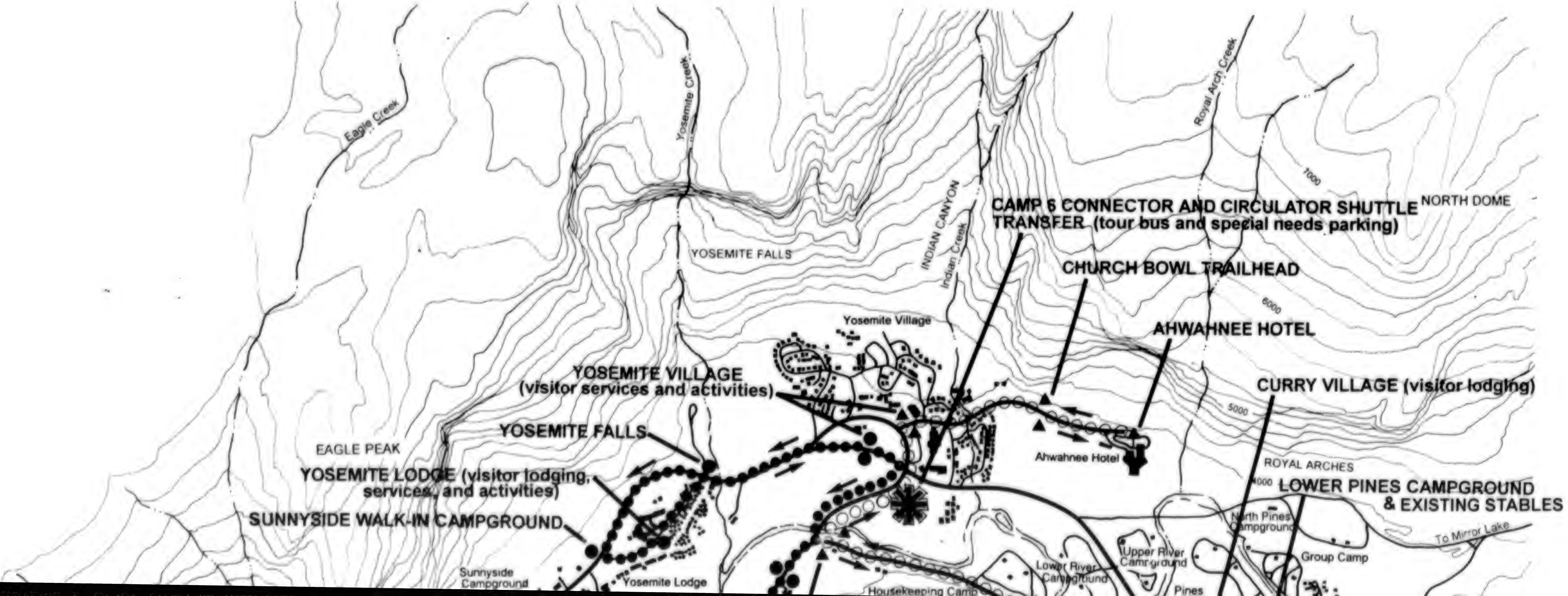
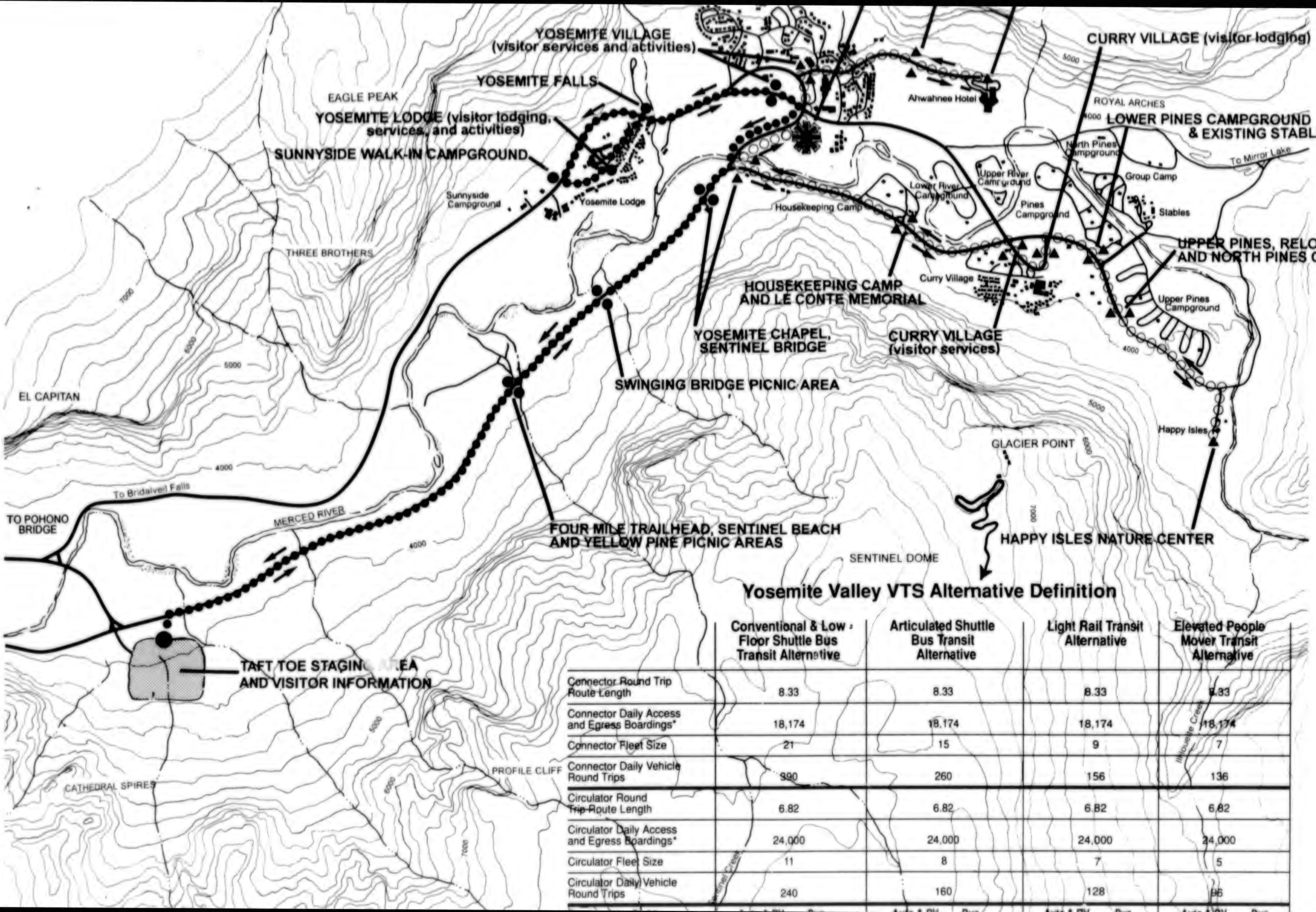


YOSEMITE VALLEY VTS ALTERNATIVE


YOSEMITE VILLAGE (visitor services and activities)
CURRY VILLAGE (visitor lodging)
YOSEMITE FALLS
EAGLE PEAK
Ahwahnee Hotel
ROYAL ARCHES
LOWER PINES CAMPGROUND & EXISTING STABLES
YOSEMITE LODGE (visitor lodging, services, and activities)
SUNNYSIDE WALK-IN CAMPGROUND
To Mirror Lake
North Pines Campground
Group Camp
Upper River Campground
Lower River Campground
Sunnyside Campground
Yosemite Lodge
Housekeeping Camp
Pines Campground
Stables
UPPER PINES, RELOCATED RIVERSIDE, GROUP CAMP, AND NORTH PINES CAMPGROUNDS
THREE BROTHERS
HOUSEKEEPING CAMP AND LE CONTE MEMORIAL
Curry Village
Upper Pines Campground
YOSEMITE CHAPEL, SENTINEL BRIDGE
CURRY VILLAGE (visitor services)
EL CAPITAN
SWINGING BRIDGE PICNIC AREA
Happy Isles
GLACIER POINT
To Bridalveil Falls
TO POHONO BRIDGE
MERCED RIVER
FOUR MILE TRAILHEAD, SENTINEL BEACH AND YELLOW PINE PICNIC AREAS
HAPPY ISLES NATURE CENTER
SENTINEL DOME
TAFT TOE STAGING AREA AND VISITOR INFORMATION
PROFILE CLIFF
CATHEDRAL SPIRES
Sentinel Creek
Illilouette Creek
4000
5000
6000
7000

Yosemite Valley VTS Alternative Definition

	Conventional & Low Floor Shuttle Bus Transit Alternative	Articulated Shuttle Bus Transit Alternative	Light Rail Transit Alternative	Elevated People Mover Transit Alternative
Connector Round Trip Route Length	8.33	8.33	8.33	8.33
Connector Daily Access and Egress Boardings*	18,174	18,174	18,174	18,174
Connector Fleet Size	21	15	9	7
Connector Daily Vehicle Round Trips	390	260	156	136
Circulator Round Trip Route Length	6.82	6.82	6.82	6.82
Circulator Daily Access and Egress Boardings*	24,000	24,000	24,000	24,000
Circulator Fleet Size	11	8	7	5
Circulator Daily Vehicle Round Trips	240	160	128	96

LEGEND:

●⇄●	YOSEMITE VALLEY CONNECTOR SHUTTLE ROUTE
●	CONNECTOR SHUTTLE STOPS
○⇄○	YOSEMITE VALLEY CIRCULATOR SHUTTLE ROUTE
▲	CIRCULATOR SHUTTLE STOPS

NOTE: VTS Alternatives Include Bus, Light Rail, and Elevated People Mover Technologies.

0 1000 2000 4000 FEET

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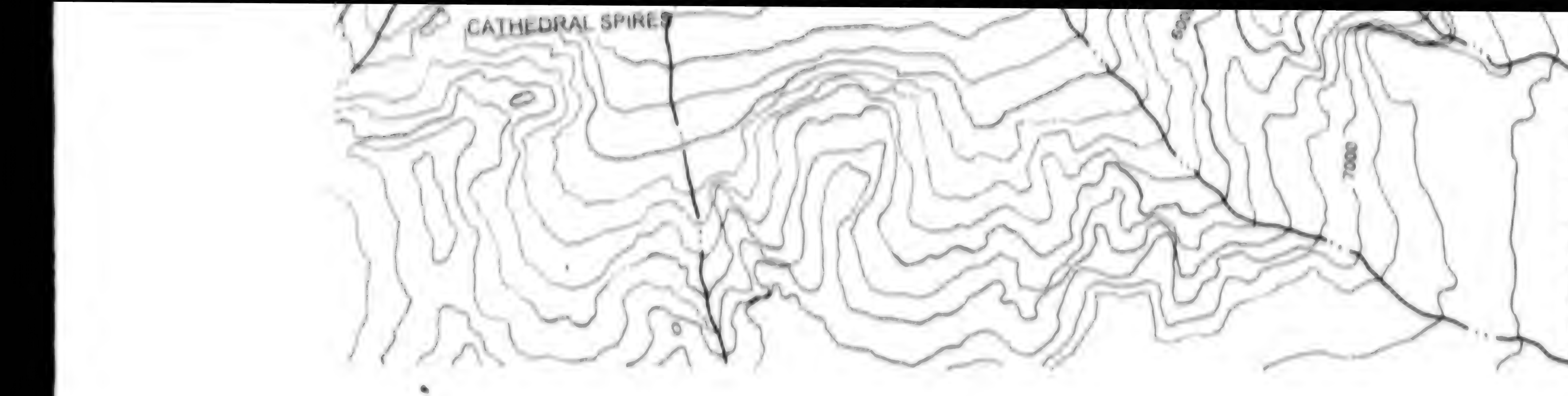

Circulator Round Trip Route Length	6.82	6.82	6.82	6.82
Circulator Daily Access and Egress Boardings*	24,000	24,000	24,000	24,000
Circulator Fleet Size	11	8	7	5
Circulator Daily Vehicle Round Trips	240	160	128	96
Staging Area Parking Spaces Required	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20

* Assumes two boardings per visitor. Additional linked trips may occur.

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0 1000 2000 4000 FEET

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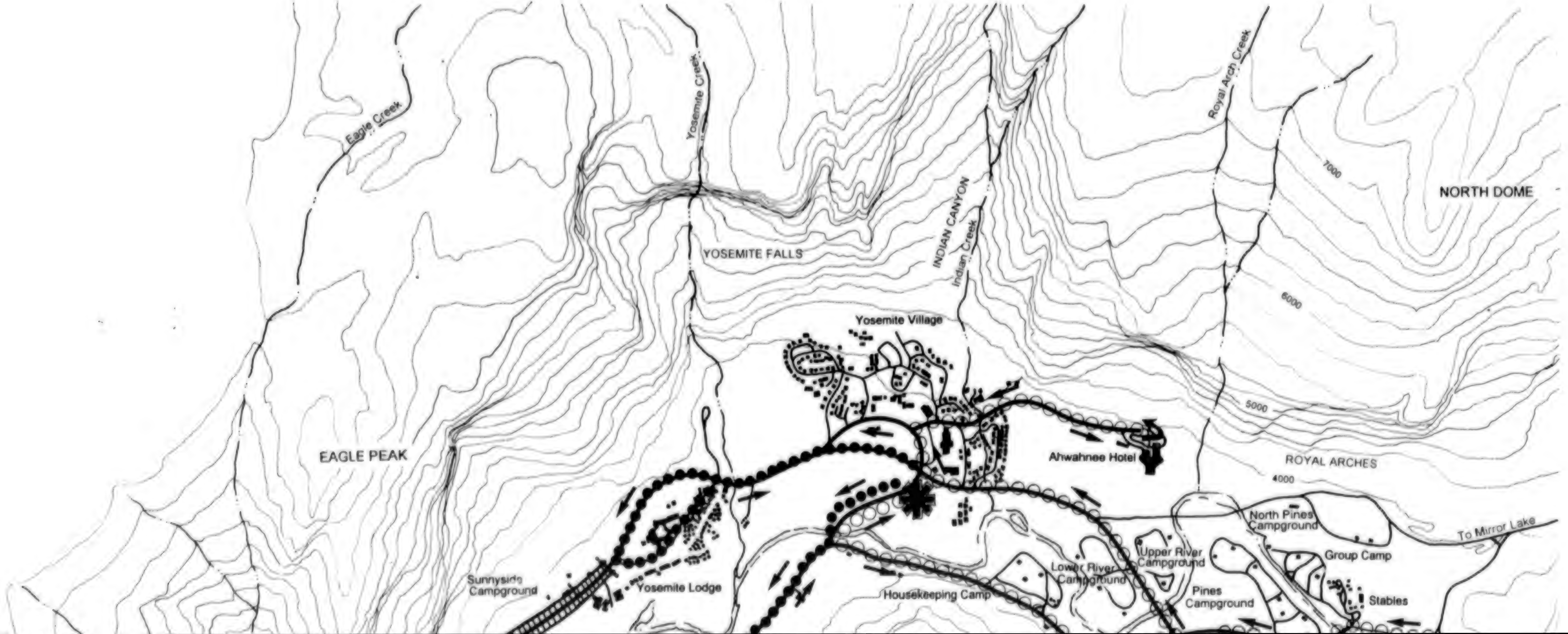

YOSEMITE VALLEY VTS-STAGE I

LEGEND:

○○○○ VALLEY CIRCULATOR SHUTTLE

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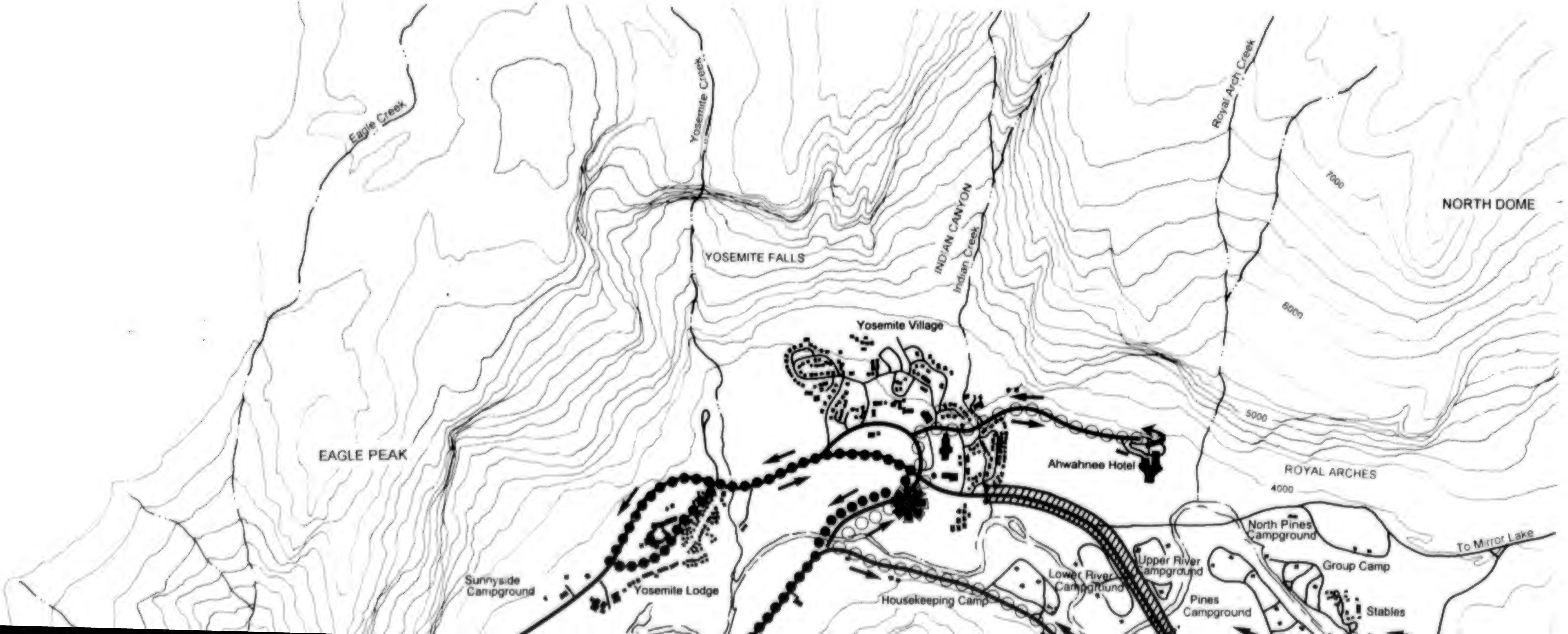
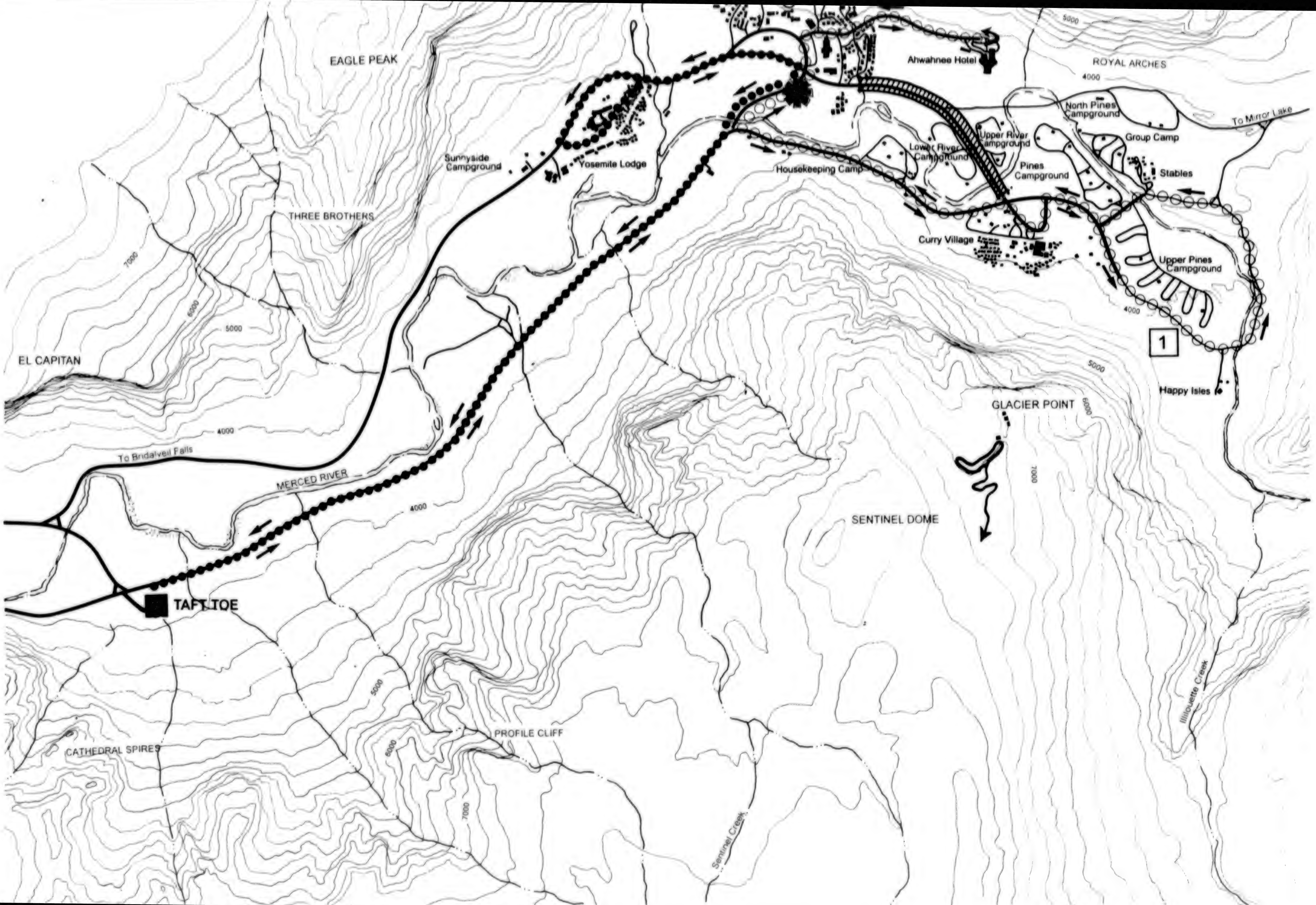
YOSEMITE VALLEY VTS-STAGE II





LEGEND:

- ⚬⚬⚬ VALLEY CIRCULATOR SHUTTLE
- ●●● VALLEY CONNECTOR
- ✱ INTERMODAL TRANSFER AT CAMP 6.
- ▨ CLOSE STONEMAN BRIDGE ROAD TO VEHICULAR TRAFFIC.
- 1 RELOCATE UPPER AND LOWER RIVERSIDE CAMPS TO UPPER PINES CAMP AREA(WEST SIDE).

0 1000 2000 4000 FEET

N

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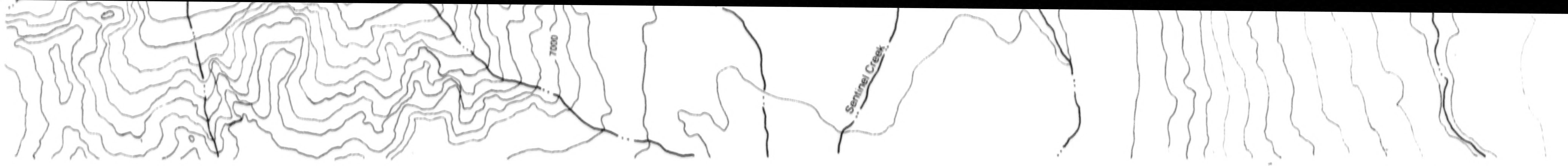

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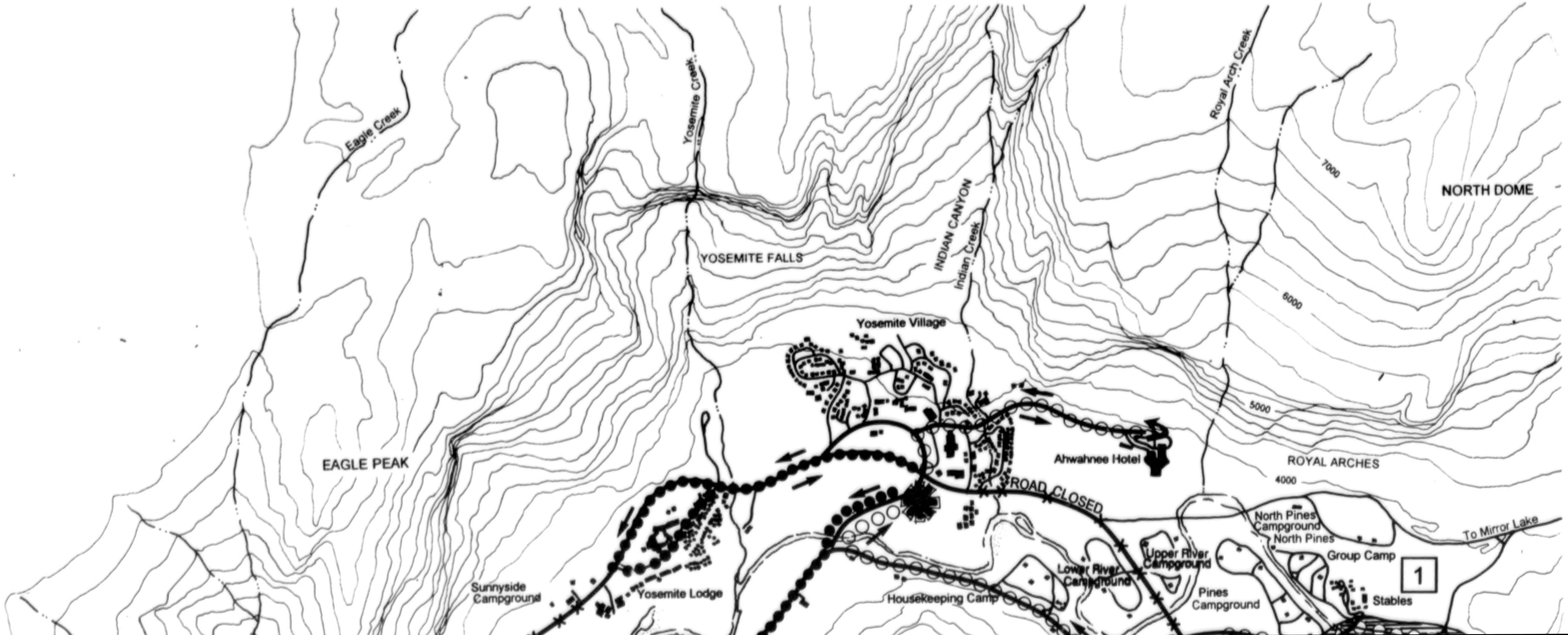


YOSEMITE VALLEY VTS-STAGE III

LEGEND:

○○○○ VALLEY CIRCULATOR SHUTTLE

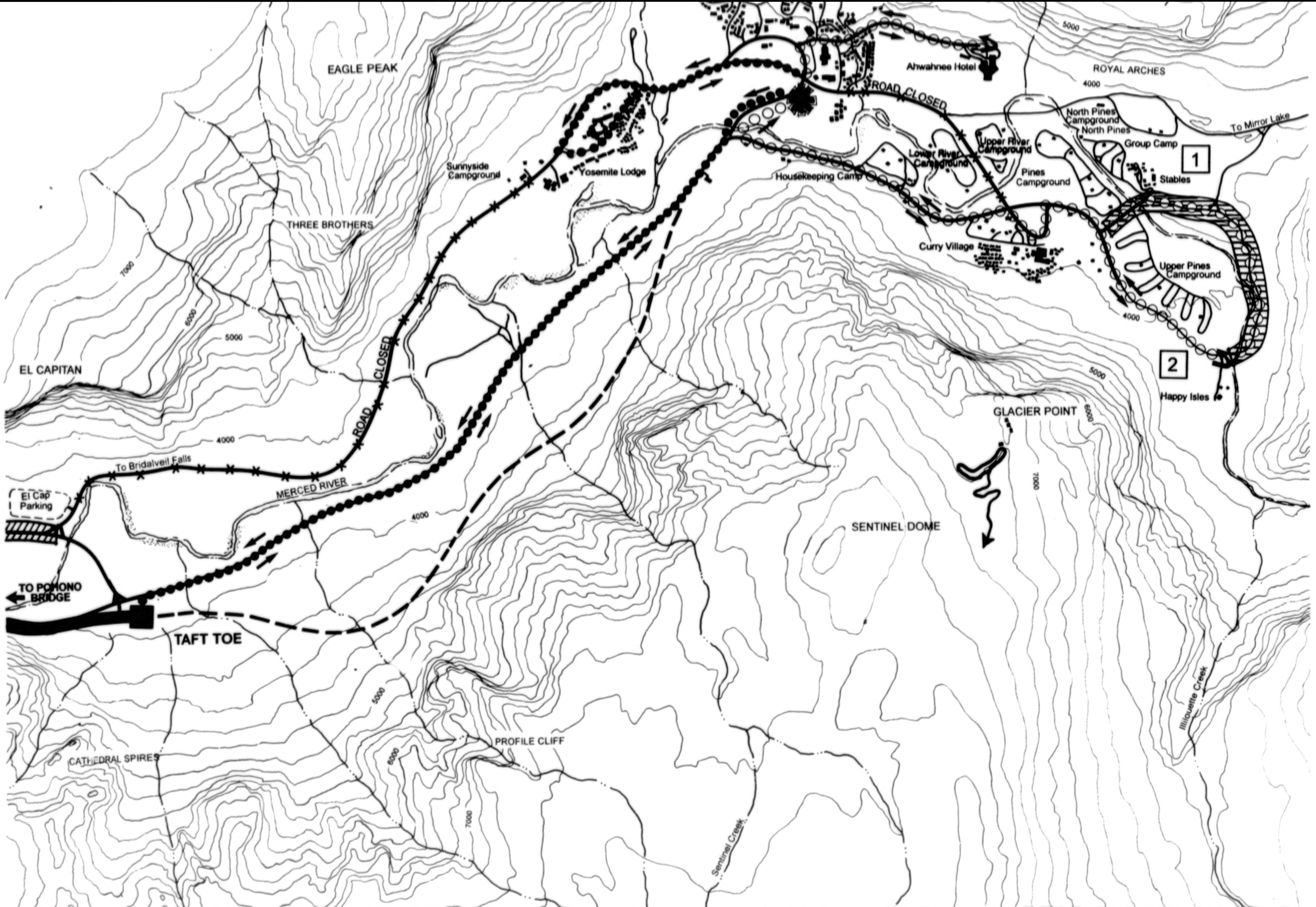
●●●● VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT

— — — OPTIONAL VALLEY CONNECTOR ALIGNMENT

✱ INTERMODAL TRANSFER AT CAMP 6.

ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE

▨ BETWEEN POHONO BRIDGE TO EL CAP



●●●●● VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT

— — — OPTIONAL VALLEY CONNECTOR ALIGNMENT

✱ INTERMODAL TRANSFER AT CAMP 6.

▨ ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE BETWEEN POHONO BRIDGE TO EL CAP CROSSOVER. PROVIDE EL CAPITAN VIEWING AND CLIMBER PARKING ACCESS.

▬ WIDEN SOUTHSIDE DRIVE AS MAJOR ACCESS TO VALLEY FROM WEST BETWEEN POHONO BRIDGE CROSSING AND TAFT TOE STAGING AREA.

1 RELOCATE STABLES.

2 RELOCATE NORTH PINES AND GROUP CAMPS TO UPPER PINES CAMP AREA.

▨ ELIMINATE SHUTTLE CIRCULATION NORTHEAST OF NATURE CENTER AND ON HAPPY ISLES AND CLARKS BRIDGES.

0 1000 2000 4000 FEET

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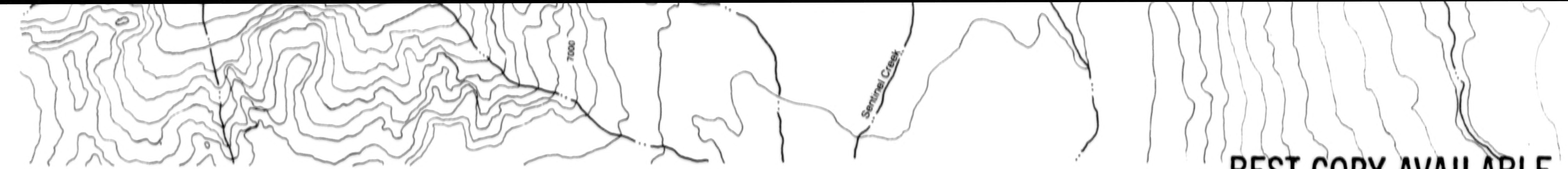

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